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GEMINI SOLAR PROJECT

Resource Management Plan Amendment and Draft Environmental Impact Statement

Volume 1: Chapters 1 – 4



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The Bureau of Land Management is responsible for the stewardship of our public lands. The BLM's mission is to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

RESOURCE MANAGEMENT PLAN AMENDMENT AND ENVIRONMENTAL IMPACT STATEMENT FOR THE GEMINI SOLAR PROJECT

Responsible Agency: United States Department of the Interior, Bureau of Land Management

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Abstract:

Solar Partners XI, LLC is proposing to construct, operate, maintain, and decommission an approximately 690-megawatt photovoltaic solar electric generating facility and associated generation tie-line and access road facilities (Project) on approximately 7,100 acres of federal lands administered by the Department of the Interior, Bureau of Land Management (BLM). The Project would be located approximately 33 miles northeast of Las Vegas and south of the Moapa River Indian Reservation in Clark County, Nevada. The expected life of the Project is 30 years. Solar Partners XI, LLC acquired an existing 44,000-acre right-of-way application filed in 2008 by BrightSource Energy, LLC for the APEX Solar Thermal Power Generation Facility. The approximately 7,100-acre Project would be located within the 44,000-acre right-of-way application area.

The 1998 *Las Vegas Resource Management Plan* (RMP) classifies the right-of-way application area as a Class III Visual Resource Management (VRM) area, which lies adjacent to Class II areas (due to the presence of the Old Spanish National Historic Trail, Muddy Mountain Wilderness Area, and Bitter Springs Back Country Byway in the Project vicinity). The Project would amend the VRM Class III objective presented in the 1998 Las Vegas RMP to a VRM Class IV objective, which would allow for management activities that require major modifications of the existing landscape character.

The BLM has prepared this Draft Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS) (RMPA/EIS) with input from cooperating agencies,¹ participating agencies,² and American Indian tribes to address the direct, indirect, and cumulative impacts of the Project. The cooperating agencies include the BLM, United States Army Corps of Engineers, United States Environmental Protection Agency, United States Department of Defense, United States Fish and Wildlife Service, Nevada Department of Wildlife, Nevada Division of Forestry, and Clark County. The United States National Park Service is a participating agency. This RMPA/EIS evaluates the Proposed Action, two alternatives to the Proposed Action, and the No Action Alternative. The Proposed Action and the alternatives involve development on approximately 7,100 acres of land within the 44,000-acre right-of-way application area; however, each action/alternative differs in how the facility would be constructed. The Proposed Action would involve solar development utilizing traditional development methods, which include disk and roll to remove vegetation in the solar array areas. The Hybrid Alternative would involve solar development utilizing traditional development methods in solar array areas (on approximately 2,500 acres) and mowing that leaves vegetation and natural land contours in place on the remaining solar array areas (on approximately 4,600 acres). The All Mowing Alternative would involve development of the facility utilizing only mowing in solar array areas. Where mowing is utilized under each alternative,

¹ Cooperating agencies are any federal agency, other than the lead agency, that has jurisdiction by law or special expertise with respect to any environmental impact that could occur with implementation of a proposed project or alternative.

² Participating agencies support lead and cooperating agencies in the execution of their authorizations and environmental review processes.

desert tortoise would be reintroduced into the remaining habitat in the solar array areas after the completion of construction. The No Action Alternative would be a continuation of existing conditions. The alternatives were developed using input from the public, stakeholders, and participating and cooperating agencies.

Major environmental and planning issues addressed include impacts on special status plant and animal species, including the State of Nevada Critically Endangered/Fully Protected threecorner milkvetch and the federally listed Endangered Mojave desert tortoise. Impacts on the Old Spanish National Historic Trail, which passes through the Project area, are also addressed.

Review Period: Comments on the Draft RMPA/EIS for the Gemini Solar Project will be accepted for 90 calendar days following publication of the United States Environmental Protection Agency's Notice of Availability in the Federal Register. Comments can be submitted through the ePlanning website, listed below. All comments must be received no later than 5:00 p.m. on September 5, 2019.

For further information, please contact:

Herman Pinales, Project Manager (702) 515-5010
Bureau of Land Management, Southern Nevada District Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Email: blm_nv_geminisolar@blm.gov
ePlanning Website: <https://go.usa.gov/xntTO>



United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Southern Nevada District Field Office, Las
Vegas Field Office, 4701 North Torrey Pines
Drive, Las Vegas, NV 89130
www.blm.gov/nv



April 5, 2019

Dear Reader:

Enclosed for your review and comment is the Draft Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS) (RMPA/EIS) for the Gemini Solar Project (Project). The Draft RMPA/EIS was prepared by the Department of the Interior, Bureau of Land Management (BLM) pursuant to the Federal Land Policy and Management Act of 1976 and the National Environmental Policy Act of 1969. The Project includes, through a right-of-way application, the construction, operation, maintenance, and decommissioning of an approximately 690-megawatt photovoltaic solar electric generating facility and associated generation tie-line and access road facilities on approximately 7,100 acres of federal lands administered by the BLM. Approval of the right-of-way application by the BLM would also require an amendment to the 1998 *Las Vegas Resource Management Plan* to make the Visual Resources Management classification in the application area compatible with solar and utility development.

In preparing the Draft RMPA/EIS, the BLM has developed a range of options to resolve resource conflicts by considering: (1) issues raised through public scoping and consultation and coordination with participating and cooperating agencies and American Indian tribes, (2) issues raised by agency resource specialists, and (3) applicable planning criteria. This process has resulted in the development of two alternatives in addition to the Proposed Action. The No Action Alternative is also addressed, which constitutes a continuation of current land management in the application area. These alternatives are described in Chapter 2 of the Draft RMPA/EIS. The BLM has identified the Hybrid Alternative as the preferred alternative. As described in the RMPA/EIS, this alternative involves maintaining approximately 65 percent of existing desert tortoise habitat to allow tortoises back into the Project area after construction of the solar arrays. Chapter 3 presents the affected environment and analyzes the potential impacts on resources or resource uses from implementation of the alternatives. Chapter 4 describes the BLM's consultation and coordination efforts throughout the process.

The BLM encourages the public to review and provide comments on the Draft RMPA/EIS. Of importance is feedback concerning the adequacy of the alternatives and any new information that would help the BLM produce the Final RMPA/EIS. In developing the Final RMPA/EIS, which is the next phase of the planning process, the BLM, as the decision-maker, may select various components from each of the alternatives analyzed in the Draft RMPA/EIS for the purpose of creating a Project that best meets the need to protect the environmental resource values of the Project area while providing for multiple uses.

The Draft RMPA/EIS is available on the Project website at: <https://go.usa.gov/xntTO>. Hard copies are also available for public review at BLM offices within the Planning Area.

Public comments will be accepted for 90 calendar days following the United States Environmental Protection Agency's publication of its Notice of Availability in the Federal Register. The BLM can best use your comments and resource information submissions if received within the review period. Written comments may be submitted as follows:

ePlanning: <https://go.usa.gov/xntTO>

Email: blm_nv_geminisolar@blm.gov

Mail: Gemini Solar Project
c/o Herman Pinales, Project Manager
Bureau of Land Management, Southern Nevada District Office
4701 N. Torrey Pines Drive
Las Vegas, NV 89130

To facilitate the analysis of comments and information submitted, we encourage you to submit comments in an electronic format. Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public meetings will be held in Las Vegas and Moapa to provide the public with opportunities to submit comments and seek additional information. The locations, dates, and times of these meetings will be announced at least 15 days prior to the first meeting via a press release and on the Project website: <https://go.usa.gov/xntTO>.

Thank you for your continued interest in the Gemini Solar Project.

Sincerely,



Timothy Z. Smith
District Manager
Southern Nevada District

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Executive Summary

Introduction

This Draft Resource Management Plan Amendment (RMPA) and Environmental Impact Statement (EIS) has been prepared by the Department of the Interior (DOI), Bureau of Land Management (BLM). The BLM is the Lead Agency under the Federal Land Policy and Management Act (FLPMA) of 1976, which governs the plan amendment process, and under the National Environmental Policy Act (NEPA), which governs the EIS process. This Draft RMPA/EIS analyzes effects of and alternatives to the Gemini Solar Project (Project) described in the Plan of Development (POD) submitted by Solar Partners, XI, LLC (Applicant).

Purpose and Need

In accordance with FLPMA, public lands are to be managed for multiple uses that consider the long-term needs of future generations for renewable and non-renewable resources. The BLM is authorized to grant rights-of-way (ROWs) on public lands for systems of generation, transmission, and distribution of electrical energy (§ 501[a][4]). Taking into account the BLM's multiple-use mandate, the BLM's purpose and need for this action is to respond to the ROW application submitted by the Applicant under Title V of FLPMA (43 United States Code [USC] § 1761) (serial number N-84631) to construct, operate, maintain, and decommission the Project. The BLM will decide whether to deny the proposed ROW, grant the ROW, or grant the ROW with modifications, and approve the RMPA. The BLM may include any terms, conditions, and stipulations it determines to be in the public interest and may include modifying the proposed use or changing the location of the proposed facilities (43 Code of Federal Regulations [CFR] 2805.10(a)(1)). Several other agencies have been identified as cooperating and participating agencies. The purpose and need for each of these agencies is to respond to authorization requests for permits and approvals to construct and operate the Project.

Applicant's Objective

The Applicant's objective 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 (GHG) emissions goals. Nevada Senate Bill 358 has been enacted to increase the renewable energy portfolio standard for state utilities from 15 percent in 2025 to 50 percent by 2030. Nevada currently sources approximately 20 percent of its electricity from renewable energy, which will require the increase in renewable energy generation by several gigawatts. California has a 60 percent by 2030 renewable energy portfolio standard, which will also require the acquisition of several gigawatts more renewable energy before that deadline. The Applicant's objective is to contribute approximately 690-megawatts (MW) to meet the demand in Nevada and/or California. A Project size of 690 MW is supported by the available developable land in the ROW application area and the transmission capacity. The Project would serve energy markets in Nevada, particularly the Las Vegas metropolitan area, and potentially southern California. Power purchase agreements are being sought by the Applicant, such as NV Energy.

Proposed Action

The Applicant is requesting BLM authorization to construct, operate, maintain, and decommission a 690-megawatt-MW photovoltaic solar electric generating facility and ancillary facilities. The proposed on-site

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solar facilities include 34.5 kilovolt (kV) overhead and underground collector lines, a 2-acre (0.8-hectare) operation and maintenance (O&M) facility, three substations, internal access roads, access roads along gen-tie lines, a perimeter road, perimeter fencing, water storage tanks for fire protection, drainage control features, a potential on-site water well or a new water pipeline, and improvements to the existing NV Energy facilities to support interconnection. The Project would result in the permanent disturbance of approximately 7,097 acres (2,873 hectares) within the 44,000-acre ROW application area. Areas that remain undisturbed and not within the fenced facility would be relinquished by the Applicant back to BLM. The Project site is located approximately 33 miles (40 kilometers) northeast of Las Vegas along Interstate 15 (I-15).

Alternatives

Several potential alternatives were identified and considered by the Applicant and the BLM. Of the various alternatives considered, the No Action, the Proposed Action, and two additional alternatives—the All Mowing Alternative and the Hybrid Alternative—were identified for analysis in the EIS. Each action alternative would include an amendment to the *1998 Las Vegas Resource Management Plan (RMP)* (1998 Las Vegas RMP), and approval of a ROW grant by BLM.

The All Mowing Alternative would involve mowing all the solar development areas to maintain vegetation largely the same as pre-Project conditions. The Hybrid Alternative would involve mowing across 65 percent of the solar array areas and developing the remaining 35 percent of the solar arrays using traditional methods that would, largely, remove all native vegetation. The Proposed Action would be constructed using all traditional methods. Desert tortoises would be allowed to move back into mowed areas when construction is complete under the All Mowing and Hybrid alternatives. Under the No Action Alternative, BLM would not approve a ROW grant and the 1998 Las Vegas RMP would not be amended.

Public Involvement with the Draft EIS

Scoping and Public Comment

Numerous opportunities for public input occur during the NEPA decision-making process. BLM published a Notice of Intent (NOI) to prepare an EIS for the Project in the Federal Register on July 13, 2018, which initiated a 45-day public scoping period that ended on August 27, 2018. BLM hosted two public scoping meetings for the Project on August 1, 2018, in Las Vegas and August 2, 2018, in Moapa Town. BLM received 34 emails and letters during the scoping period. A Scoping Report was prepared to summarize the comments received (Panorama Environmental, Inc. 2018).

Publication of the Draft EIS in the Federal Register of the United States Environmental Protection Agency's (USEPA) Notice of Availability (NOA) of the Draft RMPA/EIS initiates a 90-day public review and comment period under BLM Land Use Planning regulations (43 CFR 1610.2) and NEPA.

Areas of Controversy

Areas of controversy (40 CFR 1502.10) raised during scoping by the public and agencies that are relevant to the environmental analysis are detailed in Table Executive Summary (ES)-1. Several other resource topics in addition to those listed in the table are analyzed in the EIS, including Geology, Soils, and Mineral Resources; Paleontological Resources; Acoustics; Native American Concerns; and Transportation.

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Table ES-1 Areas of Controversy Raised During Scoping and Analyzed in Detail

Resource Topic	Issues
Land Use	Concerns that solar development should only be allowed in Designated Leasing Areas. Concerns that the Project area includes areas with wilderness characteristics that should be inventoried. Compliance with the BLM’s 1998 Las Vegas RMP and FLPMA.
Recreation	Impacts on off-highway vehicle (OHV) use and reduced public access.
Water Resources	Identification of the sources of water for Project construction and operation. Impacts from groundwater withdrawal, if used. Impacts from increased runoff due to solar field.
Vegetation and Jurisdictional Waters	Impacts on Mojave Desert plants habitat. Impacts on special habitats and special status plants, including a Nevada endangered plant, the threecorner milkvetch (<i>Astragalus geyeri</i> var. <i>triquetrus</i>). Cacti and yucca are considered government property and are regulated under the BLM forestry program. Impacts on cacti and yucca from trimming or removal. Impacts on waters of the United States, desert washes, and ephemeral streams.
Wildlife, Migratory Birds, and Special Status Species	Impacts on Mojave Desert animal habitat and specifically, Mojave desert tortoise (<i>Gopherus agassizii</i>) habitat. Impacts on desert tortoise from construction and operation. Impacts on other wildlife, including burrowing owl (<i>Athene cunicularia</i>), desert bighorn sheep (<i>Ovis canadensis nelsoni</i>), gila monster (<i>Heloderma suspectum</i>), bats, kit fox (<i>Vulpes macrotis</i>), and birds. Concerns regarding “lake effect” from solar panels on birds. Impacts from fencing and pesticide use.
Air Quality and Climate Change	Impacts from dust generation during construction and operation of the facility. Use, containment, and removal of dust control chemicals over the life of the Project.
Visual Resources	Impacts on views from the Muddy Mountains Wilderness Area and, generally, across the landscape. Impacts from Project lighting.
Cultural Resources	Impacts of the Project on the historic Arrowhead Highway and impacts on cultural and Native American resources.
Old Spanish National Historic Trail	Changes to potential and future use of the Congressionally-designated portion of the Old Spanish Trail through the Project area.
Socioeconomics and Environmental Justice	Impacts on local communities and potential for disproportionate adverse effects on minority and low-income populations. Impacts on tourism and economics.
Public Health and Safety	Impacts from waste generation, including hazardous waste and battery storage. Waste types, volumes, disposal, and management and impacts from pesticide use. Fire prevention measures to be included.

Comparison of Effects

Table ES-2 compares the anticipated effects of the Proposed Action and each alternative on the resources analyzed in this EIS. The No Action Alternative would have no effects to any of the environmental resources listed, as the Project would not be built. The No Action Alternative is not included in the table.

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Table ES-2 Comparison of Effects Across the Proposed Action, the All Mowing Alternative, and the Hybrid Alternative

Potential Effect	Proposed Action	All Mowing Alternative	Hybrid Alternative
Land Uses (Section 3.1)			
Lands and realty (Figures 3.1-1 and 3.1-2)	The Proposed Action would cross I-15 and require an encroachment permit. A letter of concurrence with the Union Pacific railroad would be needed prior to issuance of the Notice to Proceed (NTP). The gen-tie lines would cross the 2,000-foot-wide Black Mountain – Crystal utility corridor and comply with transmission line separation guidelines. The gen-tie lines would cross existing and future transmission lines. A cooperative engineering agreement and appropriate approvals would need to be obtained prior to BLM’s issuance of an NTP. BLM will decide prior to the Final EIS if construction of solar panels will be allowed through the Section 368 Energy Corridor of Concern (COC) in development area D.	Impacts would be similar to the Proposed Action, except the All Mowing Alternative would avoid adverse impacts associated with development in the Section 368 Energy COC.	Same as the Proposed Action.
Specially designated areas and lands with wilderness characteristics (Figure 3.1-3)	The Proposed Action would have an adverse visual impact on the Bitter Springs Back Country Byway (BSBCB) Specially Designated Area. The Proposed Action would have an adverse effect on the Old Spanish National Historic Trail (OSNHT) (refer to Old Spanish National Historic Trail [Section 3.13] in this table). Mitigation would be required to address adverse effects.	Similar to the Proposed Action.	Similar to the Proposed Action.
Rangeland resources	The Project area is not located within a grazing allotment. No adverse effects would occur.	Same as the Proposed Action.	Same as the Proposed Action.
Air space (Figure 3.1-4)	The Proposed Action would not conflict with military or civil airspace designations with implementation of mitigation. No adverse impacts from glint and glare or communication system interference would occur. Structures over 200 feet tall could interfere with airspace. An Obstruction Evaluation would be conducted by the Federal Aviation Administration (FAA) for any transmission facilities that are taller than 200 feet, which would need to be received by BLM prior to the ROD.	Same as the Proposed Action.	Same as the Proposed Action.
Recreation (Section 3.2)			
Change in access to existing recreation opportunities or areas (Figures 3.2-1 and 3.2-2)	Approximately 7,071 acres (2,862 hectares) of land open for recreational use would be removed for approximately 30 years (the duration of the ROW grant). The Proposed Action would sever direct access along Old Spanish Trail Road through development areas D and E, thus cutting off access between Old Spanish Trail Road and Valley of Fire Road and would cut off access on Route 167 through development area D, where it connects to the BSBCB and Valley of Fire Road. The Proposed Action would result in the loss of several OHV trails (including 39 miles [63 kilometers] of single- and two-track trails and 7 miles [11 kilometers] of existing unpaved roads). Impacts would be adverse.	Same as the Proposed Action, except access along Route 167 would be maintained through development area D. The All Mowing Alternative would result in the loss of several OHV trails (including 45.9 miles [73.9 kilometers] of single- and two-track trails and 7 miles [11 kilometers] of existing unpaved roads).	Same as the Proposed Action. The Hybrid Alternative would result in the loss of several OHV trails (including 39.4 miles [63.4 kilometers] of single- and two-track trails and 7 miles [11 kilometers] of existing unpaved roads).
Geology, Soils, and Minerals (Section 3.3)			
Seismic ground shaking and ground failure (Figure 3.3-4)	The Proposed Action would not substantially increase risk of seismic hazard exposure. There would be no risk of landslides or other destabilization.	Same as Proposed Action.	Same as Proposed Action.
Soil collapse	Potential for soil collapse and liquefaction in the Project area is low and not anticipated.	Same as Proposed Action.	Same as Proposed Action.
Increased erosion and loss of topsoil	The Proposed Action would involve approximately 7,071 acres (2,862 hectares) of surface disturbance and vegetation removal, which would increase the potential for soil erosion. Potential adverse effects would be reduced with implementation of the Stormwater Pollution Prevention Plan (SWPPP) ¹ during construction and through mitigation, including erosion stabilization, during operation. Grading for site preparation could result in loss of topsoil and would be reduced through Project best management practices (BMPs), including topsoil salvage.	The All Mowing Alternative would result in the least amount of erosion and loss of topsoil due to most of the development areas being left vegetated. This alternative includes the grading of 176 acres (71 hectares) for roads, equipment, and buildings. Potential adverse effects would be reduced with implementation of the SWPPP during construction and through mitigation, including erosion stabilization, during operation.	The Hybrid Alternative has less potential for direct and indirect effects due to 65 percent (4,460 acres [1,805 hectares]) of the development area being left vegetated, as compared with the Proposed Action. This alternative includes the construction of 2,578 acres (1,043 hectares) using traditional methods and grading as compared with 7,071 acres (2,862 hectares) for the Proposed Action. Potential adverse effects would be reduced with implementation of the SWPPP during construction and through mitigation, including erosion stabilization, during operation.

¹ Under the USEPA’s National Pollutant Discharge Elimination System stormwater permitting program, an SWPPP is required for discharges from construction activities that disturb one or more acres.

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Potential Effect	Proposed Action	All Mowing Alternative	Hybrid Alternative
Loss of minerals	No active mining claims, active oil and gas wells, or geothermal leases or operations are present on the Project site. No adverse effects on availability of mineral resources or mineral extraction would occur.	Same as the Proposed Action.	Same as the Proposed Action.
Paleontological Resources (Section 3.4)			
Loss of paleontological resources (Figures 3.4-1 and 3.4-2)	The Proposed Action would involve ground disturbance within areas of moderately paleontologically sensitive older alluvium. One known paleontological resource would be collected in accordance with mitigation. Previously undiscovered paleontological resources could be affected in areas of disk and roll and grading that would disturb the ground surface. Mitigation would be required to address adverse effects.	The All Mowing Alternative would have the fewest direct and indirect effects on paleontological resources because existing soils would be largely undisturbed. This alternative includes the grading of 176 acres (71 hectares) for roads, equipment, and buildings, where previously undiscovered paleontological resources could be found. Mitigation would be required to address adverse effects.	The Hybrid Alternative would have less impacts on soils over the 65 percent of the site that is mowed, resulting in fewer impacts on paleontological resources as compared with the Proposed Action. Previously undiscovered paleontological resources could be impacted in areas of disk and roll and grading that would disturb the ground surface. Mitigation would be required to address adverse effects.
Water Resources (Section 3.5)			
Increase in flooding and sedimentation (Figures 3.5-3 through 3.5-5)	The Proposed Action would involve approximately 7,071 acres (2,862 hectares) of surface disturbance through traditional construction methods, which could increase erosion and downstream sedimentation and deposition of fine-grained sediments during construction and operation. Implementation of the SWPPP BMPs and other mitigation would reduce the impact.	The All Mowing Alternative would result in much less surface disturbance that could increase sedimentation and runoff. Flows could still increase from clearing of roads, but impacts would be less as compared to the Proposed Action. Implementation of the SWPPP BMPs and other mitigation would minimize the impact.	The Hybrid Alternative would permanently remove 2,578 acres (1,043 hectares) of previously undisturbed native vegetation and involve mowing of 65 percent of the Project site (4,460 acres [1,805 hectares]). Flows could still increase from clearing of roads and in areas of traditional development on 35 percent of the site, but impacts would be less than with the Proposed Action. Implementation of the SWPPP BMPs and other mitigation would minimize the impact.
Potential contamination of surface water	Accidental release of oil, fuel, or other chemicals from mobile sources during construction may occur. Implementation of BMPs in compliance with the SWPPP and mitigation would reduce the impacts.	Same as the Proposed Action.	Same as the Proposed Action.
Changes to groundwater quality and quantity	The Proposed Action would have no impacts on groundwater quality. If the option to develop an on-site groundwater well is exercised, groundwater pumping would not have direct impacts on surrounding water users. Cumulative impacts on groundwater users and surface manifestations of groundwater would be minimized or avoided through the water appropriation review process.	Same as the Proposed Action.	Same as the Proposed Action.
Vegetation and Jurisdictional Waters (Section 3.6)			
Native vegetation communities (Figure 3.6-11)	Approximately 7,071 acres (2,862 hectares) of previously undisturbed native vegetation would be permanently removed by the Proposed Action.	Native vegetation would remain on site except in areas developed for utilities, buildings, and along roads (over approximately 176 acres [71 hectares]), resulting in the fewest impacts to native vegetation of the alternatives. Vegetation would still be altered through drive and crush and mowing.	The Hybrid Alternative would permanently remove 2,578 acres (1,043 hectares) of previously undisturbed native vegetation. Using mowing on 65 percent of the Project site (4,460 acres [1,805 hectares]) would result in fewer impacts on native vegetation as compared with the Proposed Action. Vegetation would still be altered through drive and crush and mowing.
Impacts on special status plant species (Figures 3.6-17 and 3.6-19)	The Proposed Action would directly impact known occurrences of threecorner milkvetch in development areas C and D and suitable habitat for threecorner milkvetch and Nye milkvetch in development areas C, D, and E. The permanent loss of 718 acres of habitat would be an adverse effect and would conflict with the BLM's commitments under the Multi-Species Habitat Conservation Plan (MSHCP). Indirect impacts would occur through spread of invasive species. Implementation of invasive species controls and other mitigation, including use of only drive and crush to construct in threecorner milkvetch habitat, would reduce but not eliminate impacts.	Adverse impacts on suitable threecorner milkvetch habitat would be similar to the Proposed Action. Indirect impacts could occur through spread of invasive species, although the likelihood of spread would be reduced because native vegetation would remain in mowed areas. Mowing would reduce impacts to soils that contain seed banks for special status plant species (Nye milkvetch).	Adverse impacts to threecorner milkvetch habitat would be similar to the Proposed Action, with reduced potential for spread of invasive species in mowed areas where native vegetation remains. Traditional development areas correspond to threecorner milkvetch habitat. Mitigation includes construction using drive and crush instead of disk and roll in order to potentially preserve some seed bank for threecorner milkvetch. Mowing would reduce impacts to soils that contain seed banks for special status plant species (Nye milkvetch).
Spread of invasive non-native species (Figures 3.6-1 through 3.6-3, and 3.6-12 through 3.6-16)	Vegetation removal and use of construction equipment would facilitate spread of invasive weeds. The Site Restoration Plan and Weed Management Plan would treat against invasive species, but weeds may persist and have an adverse effect on habitat and wildlife.	The spread of invasive species would also be an impact of the All Mowing Alternative. The spread of invasive species, however, would be less than with the Proposed	The spread of invasive species would also be an impact of the Hybrid Alternative, particularly in the 35 percent of the development areas that would be constructed using

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Potential Effect	Proposed Action	All Mowing Alternative	Hybrid Alternative
		Action. Weed treatment and herbicide use would therefore likely be less. Mowing all solar development areas would reduce soil impacts and would result in the maintenance of the most native vegetation of the alternatives. A Site Restoration Plan and Weed Management Plan would be required, similar to the Proposed Action.	traditional development methods. The spread of invasive species would be less than with the Proposed Action over 65 percent of the development areas that are mowed. Mowing would reduce soil impacts and would allow native vegetation to remain on site. Weed treatment and herbicide use would be similar to the Proposed Action for 35 percent of the site and similar to the All Mowing Alternative for 65 percent of the site. A Site Restoration Plan and Weed Management Plan would be required, similar to the Proposed Action.
Cacti/Yucca (Figures 3.6-4 through 3.6-8)	Construction activities would directly affect approximately 121,300 cacti and yucca individuals on the Project site. The Site Restoration Plan and mitigation would result in salvage of 2.1 percent of cacti and yucca. Most of the cacti and yucca would be permanently removed and destroyed, resulting in an adverse effect.	Cacti and yucca would remain on site except in utility areas and along roads, resulting in the fewest impacts. Yucca that would not survive trimming would be salvaged in accordance with the Site Restoration Plan and mitigation.	The Hybrid Alternative would reduce the number of cacti and yucca impacted to 56,957 individuals by using mowing on 65 percent of the Project site, resulting in less impacts than the Proposed Action. Cacti would be trimmed, but yucca that would not survive trimming would be salvaged in accordance with the Site Restoration Plan and mitigation.
Biocrust/Desert Pavement (Figures 3.6-9 and 3.6-10)	Approximately 414 acres (168 hectares) of biocrust and 524 acres (212 hectares) of desert pavement would be affected by grading and disk and roll. The loss of biocrust and desert pavement could increase weed infestations and dust. No mitigation is available to reduce effects, which would be adverse.	Biocrust and desert pavement would remain on site except in utility areas and along roads, resulting in the least impacts.	The Hybrid Alternative would reduce the acreage of effects to approximately 117 acres (47 hectares) of biocrust and 142 acres (57 hectares) of desert pavement by using mowing on 65 percent of the Project site, resulting in less impacts than the Proposed Action. The loss of biocrust and desert pavement would remain adverse.
Impacts on ephemeral drainages and waters of the United States (Figure 3.6-20)	Approximately 62 acres (25 hectares) of potentially jurisdictional ephemeral dry washes or channels would be indirectly or directly affected during construction and operation of the Project. Mitigation requiring avoidance of jurisdictional drainages, including a 27-acre (11-hectare) area in development area E, maintenance of predevelopment hydraulic conditions, implementation of BMPs, and compliance with United States Army Corps of Engineers (USACE) Section 404 would reduce effects. Fill quantities would likely be around 10 acres.	Permanent impacts would be limited to impacts on drainages from construction of access road crossings, utility trench crossings, and solar panel posts. Mitigation requiring avoidance of jurisdictional drainages, including a 27-acre (11-hectare) area in development area E, maintenance of predevelopment hydraulic conditions, implementation of BMPs, and compliance with USACE Section 404 would reduce effects. Approximately 1 acre (0.4 hectare) of potentially jurisdictional ephemeral dry washes or channels would be filled.	Permanent impacts would be limited to impacts on drainages from construction of access road crossings, utility trench crossings, and piers. Mitigation requiring avoidance of jurisdictional drainages, including a 27-acre (11-hectare) area in development area E, maintenance of predevelopment hydraulic conditions, implementation of BMPs, and compliance with USACE Section 404 would reduce effects. Approximately 1 acre (0.4 hectare) of potentially jurisdictional ephemeral dry washes or channels would be filled.
Wildlife, Migratory Birds, and Special Status Species (Section 3.7)			
Loss of habitat (Figure 3.6-11)	The Proposed Action would permanently remove approximately 7,071 acres (2,862 hectares) of suitable habitat for wildlife species.	The All Mowing Alternative would result in the removal of habitat on approximately 176 acres (71 hectares), which is less than the Proposed Action.	The Hybrid Alternative would result in the removal of approximately 2,578 acres (1,043 hectares) of habitat, which is less than the Proposed Action.
Migratory birds (Figures 3.7-1 through 3.7-3)	The Proposed Action could result in bird collisions with construction equipment and Project components. Implementation of Avian Power Line Interaction Committee (APLIC) measures and the Bird and Bat Conservation Strategy (BBCS) would reduce impacts.	Same as the Proposed Action.	Same as the Proposed Action.
Threatened, Endangered, and Candidate Species (Section 3.8)			
Impacts on special status species (Figure 3.8-1)	The Proposed Action would result in the loss of approximately 7,071 acres (2,862 hectares) of desert tortoise habitat from the Project site. Approximately 215 adult desert tortoises would be displaced. No long-distance translocation areas are available for successful translocation of these tortoises in the greater Northern Mojave Recovery Unit. The Proposed Action would result in take of these tortoises, which would be a substantial adverse effect on the species and the local population. Several mitigation measures are proposed to reduce effects to desert tortoise during construction and operation of the project. Indirect effects would also be adverse, including loss of connectivity.	The All Mowing Alternative would result in a small loss of vegetation (approximately 176 acres [71 hectares]); however, all desert tortoise habitat would be substantially modified. This alternative allows desert tortoise the opportunity to reoccupy all development areas after construction. Approximately 220 adult desert tortoises (and an unknown number of juveniles) would be allowed to	The Hybrid Alternative would remove less vegetation (approximately 2,578 acres [1,054 hectares]) as compared with the Proposed Action; however, all desert tortoise habitat would be substantially modified. This alternative allows desert tortoise the opportunity to reoccupy 65 percent of the development areas after construction. Approximately 183 adult desert tortoises (and an unknown number of juveniles) would be allowed to reoccupy the site

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		reoccupy the Project site or translocated a short distance away, and 34 adults desert tortoises (and an unknown number of juveniles) would be moved to an area south of development areas B and D. Several mitigation measures would reduce effects to desert tortoises during construction and operation of the solar facility. Indirect effects to connectivity would be reduced as compared with the Proposed Action since tortoise could travel through the solar facility.	or would be moved within the Project area, and 36 desert tortoises (and an unknown number of juveniles) would be moved to an area south of development areas B and D. Several mitigation measures would reduce effects to desert tortoise during construction and operation of the solar facility. Indirect effects to connectivity would be less than with the Proposed Action because tortoises could travel through 65 percent of the solar facility. Fencing around areas of traditional development would have some effects on habitat connectivity.
Air Quality and Climate Change (Section 3.9)			
Impacts on air quality from dust and vehicle emissions	The Proposed Action would involve approximately 7,097 acres (2,872 hectares) of ground-disturbance on the Project site and along the gen-tie lines and use of construction vehicles that would result in fugitive dust and vehicle emissions during construction and decommissioning. Mitigation would minimize effects, but concentrations of nitrous oxides and particulate matter greater than 10 micrometers in diameter would still exceed standards. Dust generation during O&M would not exceed standards with controls in place.	The All Mowing Alternative would involve mowing all development areas, which would reduce fugitive dust generation. Construction emissions of criteria pollutants and ambient pollutant concentrations would be similar to or would increase under the All Mowing Alternative, based on a greater duration of equipment use or a greater number of equipment pieces needed for construction. Dust generation during O&M would be reduced because vegetation would be left in the solar development areas.	Hybrid Alternative would involve mowing of a portion of the Project site, thus minimizing ground disturbance from disk and roll as well as grading to 2,603 acres (1,053 hectares). Less fugitive dust would be generated than with the Proposed Action. Construction emissions of criteria pollutants and ambient pollutant concentrations would increase for the Hybrid Alternative, based on a greater duration of equipment use or a greater number of equipment pieces needed for construction. Dust generation during O&M would be reduced as compared with the Proposed Action.
Visual Resources (Section 3.10)			
Contrasting visual elements (Figures 3.10-20 through 3.10-58)	Project features would be visible from Key Observation Points (KOPs). The Proposed Action is within Visual Resource Management (VRM) Class III area and would require an amendment to the 1998 Las Vegas RMP to Class IV objective. The VRM Class IV objective allows for management activities that require major modifications of the existing landscape character, such as the transmission facilities associated with the Project.	Maintaining the vegetation under the solar arrays (6,939 acres [2,808 hectares]) would reduce some contrast, but the most adverse impacts would occur from the transmission facilities, which would be the same as with the Proposed Action.	Impacts would be the same as with the Proposed Action. Maintaining the vegetation under 65 percent of the solar arrays (4,460 acres [1,805 hectares]) would reduce some contrast, but the most adverse impacts would occur from the transmission facilities, which would be the same as with the Proposed Action.
Acoustics (Section 3.11)			
Impacts on noise levels	Noise associated with construction, operation, and decommissioning would be negligible due the distance of the Project to sensitive residential receptors.	Same as the Proposed Action.	Same as the Proposed Action.
Cultural Resources (Section 3.12)			
Disturbance to archaeological or historic sites, including traditional cultural properties	Two National Register of Historic Places (NRHP)-eligible cultural sites, in development areas A and C, have the potential to be adversely affected by the Proposed Action. An NRHP-eligible contributing segment of the Old Spanish Trail is located in development area B and would be removed as a result of Project development. Previously undiscovered cultural resources could be impacted in areas of disk and roll and grading that would disturb the ground surface. Mitigation would reduce but not eliminate adverse effects.	The All Mowing Alternative could adversely affect three NRHP-eligible resources located in development areas A, B2, and C and the NRHP-eligible contributing segment of the Old Spanish Trail in development area B. The All Mowing Alternative would have the least potential for impacts on previously undiscovered cultural resources because most of the development areas would be left vegetated (and, thus, relatively undisturbed). This alternative includes the disturbance of 176 acres (71 hectares) for grading for roads and equipment areas in the Project site. Mitigation would reduce but not eliminate adverse effects.	The Hybrid Alternative could adversely affect two NRHP-eligible resources located in development areas A and C and the NRHP-eligible contributing segment of the Old Spanish Trail in development area B. The Hybrid Alternative would permanently remove 2,578 acres (1,043 hectares) of previously undisturbed native vegetation from the Project site by disk and roll as well as grading. Mowing on 65 percent of the Project site (4,460 acres [1,805 hectares]) would result in less impacts on previously undiscovered cultural resources than with the Proposed Action. Mitigation would reduce but not eliminate adverse effects.
Native American Concerns (Section 3.13)			
Loss of culturally important plants and wildlife habitat	The Proposed Action would result in the loss of culturally important plants, but none would be lost that are rare medical or food source plants that cannot be found in the surrounding areas.	Native vegetation would remain on site except in utility areas and along roads, resulting in the least impacts of the action alternatives.	The Hybrid Alternative would permanently remove 2,578 acres (1,043 hectares) of previously undisturbed native vegetation from the Project site by disk and roll as well as

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			grading. Mowing on 65 percent of the Project site (4,460 acres [1,805 hectares]) would reduce the loss of culturally important plants as compared with the Proposed Action.
Old Spanish National Historic Trail (Section 3.14)			
Impacts on Old Spanish National Historic Trail (Figures 3.14-1 through 3.14-3)	Development of the Project would result in modern, built features across a large portion of the valley in which the OSNHT occurs. The development of the solar facility would have adverse effects on the natural and cultural setting of the valley due to the degree of modern change that it introduces as well as impacts to recreation and public access, which would be considered a substantial interference with and a substantial interference with the nature, purpose, and primary uses of the trail. Commensurate mitigation (BLM MS-6280) and cultural resources laws and policies requires developing a Memorandum of Agreement (MOA) with the National Park Service Trail Administration Office, in consultation with the BLM Old Spanish Trail Administrator (OSTA) to define additional measures to minimize effects to the OSNHT and its nature and purposes and primary uses.	Impacts would be similar to the Proposed Action for the 30 years of the ROW grant. The All Mowing Alternative includes minimizing disturbance and maintaining the native vegetation, soils, hydrology, and fauna in the solar array areas, which protects some of the important aspects of the setting of the trail, such that the trail's purpose, need and primary uses could be restored shortly after decommissioning, removing any substantial interference with the nature, purpose, and primary uses of the trail.	Impacts would be a combination of those described for the Proposed Action and the All Mowing Alternative. Mitigation requires that drive and crush methods to preserve soils, vegetation root structures, and hydrology be used instead of disk and roll in traditional development areas (35 percent of the site), which could support a similar restoration to restore the trail after decommissioning as the All Mowing Alternative, and thus, removal of the substantial interference with the nature, purpose, and primary uses of the trail.
Socioeconomics and Environmental Justice (Section 3.15)			
Employment	The Proposed Action workforce is expected to average 500 to 700 workers (with a maximum of 900) during construction and 19 workers during operation. The workforce is anticipated to be sourced from the labor pool within Clark County. The increased opportunity of employment would be considered beneficial to the local community.	Similar to the Proposed Action, but a larger workforce may be needed to construct the entire solar field with mowing. Greater job opportunities and benefits could result.	Similar to the Proposed Action but a larger workforce may be needed to construct 65 percent of the solar field with mowing. Greater job opportunities and benefits could result.
Economics	The employment associated with construction and operation of the Proposed Action would have beneficial effects beyond just labor income, and effects on the regional economy as a result of constructing the Proposed Action would be beneficial.	The larger workforce size, if needed, would result in a greater economic benefit to the regional economy than the Proposed Action.	Similar to the All Mowing Alternative.
Housing	Vacancy rates of 10 percent (38,583 units) and availability of temporary accommodations would accommodate the potential influx of workers during construction. Effects on the housing market from O&M workers would be negligible.	Similar to the Proposed Action.	Similar to the Proposed Action.
Public services	The Proposed Action and influx of workers during construction would minimally affect public services. Additional public services would not be required due to construction or operation.	Similar to the Proposed Action.	Similar to the Proposed Action.
Disproportionate effects on minority or low-income populations (Figure 2-1)	The Proposed Action would not result in a disproportionate effect on the minority population and low-income population of Native Americans on the Moapa River Indian Reservation. The employment associated with construction of the Proposed Action would have beneficial effects. Adverse health or cultural impacts are not anticipated.	Similar to the Proposed Action.	Similar to the Proposed Action.
Travel and Transportation Management (Section 3.16)			
Roadway operations (Figure 3.16-1)	Under the Proposed Action during peak construction activity, roadways and freeways used to support the Project would operate at a volume lower than the LOS C capacity. Implementation of a Traffic and Transportation Plan would minimize impacts related to roadway operations and traffic hazards.	Similar to Proposed Action.	Similar to the Proposed Action.
Public Health and Safety (Section 3.17)			
Occupational Health and Safety	Adverse effects on workers could occur during construction as well as O&M; any adverse effects would be minimized through safety standards, protective equipment, and mitigation.	Same as the Proposed Action.	Same as the Proposed Action.
Electric and Magnetic Fields (EMF)	The closest residences are approximately 13 miles (21 kilometers) north of the Project site. No residences or other uses would be subject to EMF exposure from the proposed transmission interconnection line.	Same as the Proposed Action.	Same as the Proposed Action.
Environmental Site Contamination	No known spills or uncontrolled releases of hazardous materials or wastes, or other issues associated with chemicals, were identified for the Project area. Mitigation would minimize the potential exposure of workers to existing unknown hazardous materials.	Same as the Proposed Action.	Same as the Proposed Action.
Risk of Hazardous Materials Accidents or Spills	Accidental spills of chemicals and fuels could occur during construction or operation and would be handled in accordance with the Spill Prevention, Control, and Countermeasure (SPCC) plan.	Same as the Proposed Action.	Same as the Proposed Action.

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Potential Effect	Proposed Action	All Mowing Alternative	Hybrid Alternative
	Implementation of the SWPPP, mitigation measures, and compliance with regulations would minimize risk of hazards associated with accidents and spills.		
Solid waste management	Solid waste generated during construction, operation, and decommissioning would not exceed the capacity of local landfills. Batteries and hazardous wastes would be disposed of in accordance with a Waste Management Plan.	Same as the Proposed Action.	Same as the Proposed Action.
Emergency response interferences	Construction could require short-term closure of I-15 during installation of the gen-tie lines. With proper coordination with the Nevada Department of Transportation (NDOT) and implementation of encroachment permit requirements, adverse effects would not occur. An Emergency Response Plan would be prepared to address worker evacuation in an emergency.	Same as the Proposed Action.	Same as the Proposed Action.
Public health	The Proposed Action would not increase risks of bringing West Nile Virus and Zika to the area. Implementation of mitigation measures to control fugitive dust would minimize the risk to workers of contracting valley fever.	Same as the Proposed Action. Herbicide use that can have impacts on applicator and worker safety would be reduced.	Same as the Proposed Action. Herbicide use that can have impacts on applicator and worker safety would be reduced by 65 percent as compared with the Proposed Action.
Intentionally destructive acts	The risk to workers or the public from intentionally destructive acts is low. Public access would be controlled by security and fencing.	Same as the Proposed Action.	Same as the Proposed Action.
Fire risk	The Project area is within a low-risk area for fires, and implementation of a Fire Prevention and Safety Plan would further minimize adverse effects related to fires. Fire risks would be lowest for this action because no vegetation that could ignite and spread fires would remain after site development. If weeds spread to surrounding areas or are contained and removed on site, fire risks could increase. An Integrated Weed Management Plan and Site Restoration Plan would address weeds, although weed spread could still occur, given the amount of exposed soil.	Fire risks would be similar to existing conditions, which is low risk for fire. Weed spread would be reduced under this alternative because more native vegetation would remain in place. An Integrated Weed Management Plan and Site Restoration Plan would address weeds.	Fire risks in traditional development areas (35 percent of the site) would be similar to the Proposed Action, and the fire risks in mowed areas (65 percent of the site) would be similar to the All Mowing Alternative. An Integrated Weed Management Plan and Site Restoration Plan would address weeds.

Chapter 1 Introduction and Purpose and Need

1.1 Introduction

This Draft RMPA and EIS has been prepared by the DOI, BLM. The BLM is the Lead Agency under the FLMPA of 1976 and NEPA.

1.2 Purpose and Need

In accordance with FLPMA, public lands are to be managed for multiple uses that consider the long-term needs of future generations for renewable and non-renewable resources. The BLM is authorized to grant ROWs on public lands for systems of generation, transmission, and distribution of electrical energy (Section 501[a][4] and 43 CFR 2800). Taking into account the BLM's multiple-use mandate, the BLM's purpose and need for this action is to respond to the ROW application submitted by the Applicant under Title V of FLPMA (43 USC § 1761) (serial number N-84631) to construct, operate, maintain, and decommission the Project in compliance with FLPMA, BLM ROW regulations, the BLM NEPA Handbook, DOI NEPA regulations, and other applicable federal and state laws and policies. The Project would include a solar generation power plant and ancillary facilities on approximately 7,100 acres (2,873 hectares) of BLM land in Clark County, Nevada, that would produce approximately 690-megawatts alternating current (MWac), as described in the POD (Solar Partners, XI, LLC 2019).

The BLM will decide whether to deny the proposed ROW, grant the ROW, or grant the ROW with modifications and approve the RMPA. The BLM may include any terms, conditions, and stipulations it determines to be in the public interest and may include modifying the proposed use or changing the location of the proposed facilities (43 CFR 2805.10(a)(1)). In the decision process, the BLM's resource management goals, objectives, opportunities, and/or conflicts will be considered for how they relate to this non-federal use of public lands.

Several other agencies have been identified as cooperating and participating agencies. The purpose and need for each of these agencies is to respond to authorization requests for permits and approvals to construct and operate the Project, as listed below in Table 1.6-1 under Section 1.6: Relationships to Other Policies, Plans, and Programs.

1.3 Applicant's Objectives

The Applicant's objective 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 GHG emissions goals. Nevada voters approved a measure (Question 6) in November 2018 to increase the renewable energy portfolio standard for state utilities from 15 percent in 2025 to 50 percent by 2030. Nevada currently sources approximately 20 percent of its electricity from renewable energy, which will require the increase in renewable energy generation by several gigawatts. California has a 60 percent by 2030 renewable energy portfolio standard, which will also require the acquisition of several gigawatts more renewable energy before that deadline. The Applicant's objective is to contribute approximately 690 MW to meet the demand in Nevada and/or California. A Project size of 690 MW is supported by the available developable land on the Project site and the transmission capacity in the area. According to data provided by the National Renewable Energy Laboratory, the average acreage of land required per MWac for single axis solar tracking systems is approximately 9 acres (3.6 hectares) (Montgomery 2013). The

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Solar Energies Industry Association identifies between 5 and 10 acres (2 to 4 hectares) per MWac, depending on technology used (Solar Energy Industry Association 2019). The Applicant has requested up to 7,100 acres (2,873 hectares), 14 percent above the average acreage needed, in anticipation that areas may be removed to avoid sensitive resources, waters of the United States, or for other restrictions. Only land used for development of the solar field during the final design would ultimately be issued in the ROW.

The Project would serve energy markets in Nevada, particularly the Las Vegas metropolitan area, and potentially southern California. Power purchase agreements are being sought by the Applicant, such as with NV Energy.

1.4 Areas of Controversy and Related Resource Topics Identified through Scoping

The BLM identified issues to be addressed in the EIS through public and internal scoping and through outreach to cooperating and participating agencies and American Indian Tribes. The BLM published a NOI to prepare an EIS for the Project in the Federal Register on July 13, 2018, which initiated a 45-day public scoping period, ending on August 27, 2018.

The BLM hosted two public scoping meetings for the Project on August 1, 2018, and August 2, 2018. Comment documents were received from 34 entities during the scoping period. Nearly all comments had some relevancy to an EIS topic covered under NEPA. Table 1.4-1 presents the primary issues identified during scoping. Additional detail regarding the scoping process, scoping comments received, and issues identified during scoping is available in the *Scoping Report for the Gemini Solar Project* (Panorama Environmental, Inc. 2018). Several other resource topics not identified by the public or agencies as areas of controversy during scoping are analyzed in the EIS, including Geology, Soils, and Mineral Resources; Paleontological Resources; Acoustics; Native American Concerns; and Transportation.

Table 1.4-1 Areas of Controversy Raised During Scoping and Analyzed in Detail

Resource Topic	Issues
Land Use	Concerns that solar development should only be allowed in Designated Leasing Areas. Concerns that the Project area includes areas with wilderness characteristics that should be inventoried. Compliance with the BLM's 1998 Las Vegas RMP and FLPMA.
Recreation	Impacts on OHV use and reduced public access.
Water Resources	Identification of the sources of water for Project construction and operation. Impacts from groundwater withdrawal, if used. Impacts from increased runoff due to solar field.
Vegetation and Jurisdictional Waters	Impacts on Mojave Desert plants habitat. Impacts on special habitats and special status plants, including a Nevada endangered plant, the threecorner milkvetch (<i>Astragalus geyeri</i> var. <i>triquetrus</i>). Cacti and yucca are considered government property and are regulated under the BLM forestry program. Impacts on cacti and yucca from trimming or removal. Impacts on waters of the United States, desert washes, and ephemeral streams.
Wildlife, Migratory Birds, and Special-Status Species	Impacts on Mojave Desert animal habitat, and specifically, desert tortoise (<i>Gopherus agassizii</i>) habitat. Impacts on desert tortoise from construction and operation. Impacts on other wildlife, including burrowing owl (<i>Athene cunicularia</i>),

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Resource Topic	Issues
	bighorn sheep (<i>Ovis canadensis</i>), gila monster (<i>Heloderma suspectum</i>), bats, kit fox (<i>Vulpes macrotis</i>), and birds. Concerns regarding “lake effect” from solar panels on birds. Impacts from fencing and pesticide use.
Air Quality and Climate Change	Impacts from dust generation during construction and operation of the facility. Use, containment, and removal of dust control chemicals over the life of the Project.
Visual Resources	Impacts on views from the Muddy Mountains Wilderness Area and, generally, across the landscape. Impacts from Project lighting.
Cultural Resources	Impacts of the Project on the historic Arrowhead Highway and impacts on cultural and Native American resources.
Old Spanish National Historic Trail	Changes to potential and future use of the Congressionally designated portion of the Old Spanish Trail through the Project area.
Socioeconomics and Environmental Justice	Impacts on local communities and potential for disproportionate adverse effects on minority and low-income populations. Impacts on tourism and economics.

1.5 BLM Resource Topics Considered but Not Analyzed in Detail

Resource topics and issues considered but dismissed from detailed analysis in this EIS are listed in Table 1.5-1, along with the rationale for dismissal.

Table 1.5-1 Resource Topics Dismissed from Detailed Analysis

Resource Topic	Rationale for Dismissal from Detailed Analysis
National Conservation Lands	BLM public lands along the OSNHT are National Conservation Lands. Please refer to the OSNHT sections of this document as well as the Visual, Recreation and Cultural Resources sections for key findings and references to this unit of the National Landscape Conservation System.
Wild Horses and Burros	Wild horses and burros are not found in the Project area. A burro herd is found approximately 3.5 miles (5.6 kilometers) south of the Project site in the Muddy Mountains but does not use the Project area.

1.6 Relationships to Other Policies, Plans, and Programs

The BLM recognizes the importance of state, Tribal, and local plans. Applicable laws, regulations, and policies are listed in Appendix E: Laws, Regulations, Policies, and Plans Considered in Development of the EIS.

In addition to the EIS, implementing the Proposed Action would require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the Project. Table 1.6-1 lists the required permits or approvals that are already in place or would be obtained and the responsible regulatory agencies. The Applicant is responsible for applying for and acquiring permits, as needed.

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Table 1.6-1 Federal, State, and Local Permits and Authorizations

Federal Permits, Authorizations or Inter-Agency Consultations
<p><i>DOI, BLM</i></p> <ul style="list-style-type: none"> • ROW grant under Title V of FLPMA • EIS and Record of Decision to support issuance of ROW grant • RMPA • Contract for the Sale of Mineral Materials and free-use-permit (if needed) • Concurrence letter from Union Pacific Railroad
<p><i>DOI, BLM and State Historic Preservation Office/Advisory Council on Historic Preservation</i></p> <ul style="list-style-type: none"> • BLM/State Historic Preservation Office, National Historic Preservation Act Section 106 Consultation • 18 USC Section 841-848; 27 CFR 181
<p><i>DOI, Fish and Wildlife Service</i></p> <ul style="list-style-type: none"> • Endangered Species Act, Section 7 Consultation and Biological Opinion/Incidental Take Statement • 16 USC 1531 et seq. Biological Opinion and Take Authorization
<p><i>DOI, National Parks Service</i></p> <ul style="list-style-type: none"> • Participant in the review of impacts on the Congressionally designated Old Spanish Trail
<p><i>United States Army Corps of Engineers</i></p> <ul style="list-style-type: none"> • Permit for the discharge of dredged and/or fill material into waters of the United States under Section 404 of the Clean Water Act
<p><i>United States Department of Defense, Nellis Air Force Base</i></p> <ul style="list-style-type: none"> • Review of Project for conflicts with military uses
<p><i>United States Federal Aviation Administration</i></p> <ul style="list-style-type: none"> • Notice of Proposed Construction or Alteration and Obstruction Evaluation
State of Nevada Permits or Authorizations
<p><i>Nevada State Historic Preservation Office</i></p> <ul style="list-style-type: none"> • BLM/State Historic Preservation Office, National Historic Preservation Act Section 106 Consultation
<p><i>Nevada Department of Wildlife</i></p> <ul style="list-style-type: none"> • Implementation of terms and conditions of the Biological Opinion • Fund for the Recovery of Costs • Scientific Collection Permit (for subcontractor)
<p><i>Nevada Division of Environmental Protection (NDEP)</i></p> <ul style="list-style-type: none"> • Prevention of Significant Deterioration Program, Major Source Permit • Operating Permit to Construct • General Stormwater Permit for Construction Activities (NOI 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

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<p><i>Nevada Division of Forestry</i></p> <ul style="list-style-type: none">• Native Cacti and Yucca Commercial Salvaging and Transportation Permit• State List Endangered Species Take Permit
<p><i>Nevada Public Utilities Commission</i></p> <ul style="list-style-type: none">• Nevada Utility Environmental Protection Act Permit
<p><i>Nevada Department of Motor Vehicles and Public Safety</i></p> <ul style="list-style-type: none">• Nevada State Hazardous Materials Permit or Roving Permit
<p><i>Nevada Department of Transportation</i></p> <ul style="list-style-type: none">• ROW Occupancy Permit for facilities, such as transmission lines crossing state highways
<p>Clark County Permits</p>
<p><i>Clark County Department of Air Quality</i></p> <ul style="list-style-type: none">• Dust Control Permit
<p><i>Clark County Regional Flood Control District</i></p> <ul style="list-style-type: none">• Drainage Study Review
<p><i>Clark County Department of Comprehensive Planning</i></p> <ul style="list-style-type: none">• Special Use Permit
<p><i>Clark County Building Department</i></p> <ul style="list-style-type: none">• Grading Permit• Building Permit

Chapter 2 Proposed Action and Alternatives

2.1 Introduction

2.1.1 Right-of-Way Application and Proposed Action

The Applicant filed an application to construct, operate, and decommission the Gemini Solar Project, consisting of up to a nominal² 690-MW alternating current (AC) solar photovoltaic (PV) power generating facility on BLM-administered land in Nevada. The Applicant is seeking a ROW grant for the Project in order to develop up to 7,100 acres (2,873 hectares) within the 44,000-acre (17,806-hectare) ROW application area. The Project would be located on federal lands administered by the BLM under the 1998 Las Vegas RMP (BLM 1998).

The Project, as presented in the ROW application, is considered the Proposed Action in this EIS. The Project site is located approximately 33 miles (53 kilometers) northeast of Las Vegas along I-15. The regional context is shown in Figure 2-1, and the Project location is shown in Figure 2-2. Figure 2-3 shows the development areas within the Project application area and the Project elements that comprise the Proposed Action. All figures referenced in this chapter are presented in Appendix D.

2.1.2 Development of Alternatives

In accordance with the Council on Environmental Quality's (CEQ) NEPA Regulations (40 CFR 1502.14), an EIS must present the environmental impacts of a Proposed Action and alternatives to that Proposed Action in comparative form. The EIS must define the issues to be readily understood by the public and decision makers, thus contributing to a basis for an informed and reasoned decision.

Alternatives to the Proposed Action were developed by the BLM to avoid or reduce various resource conflicts (refer to Figure 2-4 for the key resource constraints). Key resource constraints include the Mojave desert tortoise, waters of the United States, threecorner milkvetch, a Section 368 Energy COC, and the OSNHT corridor. Several additional areas within the 44,000-acre (17,806 hectare) ROW application area were studied by the Applicant to assist BLM in the development of alternatives to the Proposed Action. Approximately 3,600 acres (1,457 hectares), identified as development areas B1, B2, F, and G, were studied (Figure 2-5) in addition to the 7,100 acres (2,873 hectares) that comprise the Proposed Action.

Several alternatives to the Proposed Action were devised and then screened by the BLM, based on the following criteria (refer to BLM NEPA Handbook § 6.6.3):

- Does the alternative respond to the BLM's purpose and need?
- Does it meet most of the basic objectives of the Project?
- Is its implementation technically and economically feasible³?
- Is it consistent with the basic policy objectives for the management of the area?
- Is its implementation remote or speculative?

² Nominal power refers to the nameplate or peak capacity of the photovoltaic system.

³ Economic feasibility does not cover speculation about an applicant's costs or profit. It refers to whether the implementation of the alternative is likely, given past and current practice and technology.

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- Is it substantially similar in design to an alternative that is analyzed?
- Would it have substantially similar effects on an alternative that is analyzed?
- Would it avoid or substantially lessen any significant effects of the Project?

Two alternatives to the Proposed Action passed the screening and were identified for evaluation in this EIS. Additional information on the development and details of the alternatives to the Proposed Action is provided in the *Alternatives Report* (Panorama Environmental, Inc. 2019b), including other alternatives considered but eliminated from further analysis.

Each alternative is approximately 7,100 acres (2,873 hectares). The primary, although not the only, difference between the Proposed Action and the two alternatives is in how the Project would be constructed and operated. An alternative method of site development, known as mowing, is included in each alternative. Vegetation would be mowed in the solar development areas instead of completely removed through disking and compacting the soils on the site (a process known as “disk and roll” or “traditional development methods”). When construction is complete, the security fencing around the mowed areas would be modified allowing approximately 8 inches (20 centimeters) of space at the bottom of the fence to allow desert tortoise the opportunity to reoccupy the solar development areas. Solar development areas constructed using mowing would also experience reduced erosion and runoff and reduced spread of invasive or noxious weed species, as compared to areas where vegetation is completely removed through disk and roll. The entire site would be mowed under the All Mowing Alternative. Approximately 65 percent of the site would be mowed, and 35 percent would be constructed using traditional methods under the Hybrid Alternative.

The following section describes the Project as it would be under the Proposed Action, the All Mowing Alternative, and the Hybrid Alternative. Many aspects of the Project are similar for the Proposed Action and both alternatives. Elements of the Project common to the Proposed Action and the two alternatives are described first, followed by the differences for each.

2.2 Proposed Action and Alternatives

2.2.1 Project Elements Common to the Proposed Action and Alternatives

Right-of-Way Application

Under the Proposed Action and each alternative, the Applicant is seeking a ROW for development of the Project.

Resource Management Plan Amendment

The Proposed Action and each alternative include amending the VRM Class III objective in the 1998 Las Vegas RMP to a VRM Class IV objective, which will allow for management activities that require major modifications of the existing landscape character.

Project Components

The Project, as defined for the Proposed Action and the alternatives, would include the following elements:

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Solar Field

- Solar array blocks consisting of solar PV modules mounted on single-axis, horizontal tracker mounting systems supported by driven steel posts (or piers) or other embedded foundation design (refer to Figure 2-6 for a typical section of a solar array block and Figure 2-7 for an elevation drawing of a single-axis horizontal tracker);
- PV modules with either traditional panels that capture sunlight from one side of the panel, or bifacial panels that absorb light from both sides of the panels, including energy reflected up from the ground surface;
- Integrated, climate-controlled energy storage system (battery system) consisting of approximately 425, 5-megawatt-hour, 4-hour battery systems with approximately 53,550 individual batteries (may be lithium ion) enclosed in a container and installed adjacent to each inverter (Figure 2-8);
- Direct current (DC) collection system and Power Conversion Stations (PCSs) to collect power from the array blocks (Figure 2-9), with one PCS for approximately every four array blocks;
- Overhead and underground 34.5 kV AC collection system (typical pole shown in Figure 2-10) to convey electricity from the Photovoltaic Combining Switchgear (PVCSs) (Figure 2-11) to the substations;
- On-site microwave and wireless systems to collect and send data to a supervisory control and data acquisition (SCADA) system; and
- One meteorological tower (steel lattice), approximately 30 feet (9.1 meters) high, mounted on concrete foundations, installed at the northern boundary of the solar development area near the O&M facilities.

Infrastructure and Ancillary Systems

- A roadway system that would vary for the Proposed Action and alternatives (Figure 2-12 includes a cross section of a typical road);
- Access roads along Project generation-tie (gen-tie) lines, constructed in accordance for use by NV Energy to be a minimum 20 feet (6.1 meters) wide with an all-weather (aggregate) surface;
- 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 aboveground water storage tanks and delivery pipelines, septic system, security fencing, signage, lighting, and potentially a flagpole, and a driveway for site access off of Valley of Fire Road near the O&M building and off Valley of Fire Road to access development areas D and E (Figure 2-13);
- Project security using a combination of perimeter security fencing, controlled access gates, on-site security patrols, lighting, electronic security systems, and/or remote monitoring;
- Desert tortoise exclusion fencing, which would vary for the Proposed Actions and alternatives (Figure 2-14 shows typical desert tortoise fencing);
- Drainage control, which would vary for the Proposed Action and alternatives;
- An option for an on-site water well or a water pipeline extending from the Moapa Paiute Travel Plaza to the Project site, or an alternate option for trucking water; and
- Four temporary on-site water storage ponds and pump systems of varying sizes during construction.

Gen-Tie/Transmission System

New power line systems that would be constructed to support the Project would include the following:

- Up to three on-site substations hosting on-site ringbus substations (Figure 2-15);

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- Up to three gen-tie lines, ranging from 2 to 4.75 miles (3 to 7.6 kilometers) long, (typical transmission structures shown in Figure 2-16) extending from the Project substations to NV Energy's Crystal Substation, consisting of two 230 kV circuits and one 500 kV circuit as follows:
 - ROW width of 100 feet (30.5 meters) for each 230 kV line
 - ROW width of 200 feet (61 meters) for the 500 kV line
 - ROW width of 300 feet (91 meters) where the two 230 kV lines and one 500 kV line converge into one corridor; and
- Redundant telecommunication systems and cables installed in tandem with the gen-tie lines as required by NV Energy Large Generator Interconnection Agreement, as well as on-site microwave and wireless systems.

Project Construction

Construction Sequencing

Construction of the Proposed Action and Alternatives would follow the sequencing described below:

- **Geotechnical Investigations:** Prior to construction and after BLM-approval, a geotechnical investigation of the Project site would be necessary to finalize engineering specifications.
- **Temporary Staging Areas:** Temporary staging areas would be established to facilitate construction activities and mobilize equipment and materials.
- **Site Preparation:** Site preparation would include land surveying and site delineation; resource fencing and clearances (including for desert tortoises); trenching and excavation; and dust, erosion and sediment control. Incised drainages would be left in place and largely unaltered, and land contours would be maintained to maintain existing site hydrology after construction; any saleable mineral materials would likely be balanced on the Project site (i.e., any saleable minerals extracted from within the ROW would be used within the ROW for construction); if any excess saleable mineral materials are generated during construction, the materials would be disposed of and exported from the Project site through a BLM Contract for the Sale of Mineral Materials or Free Use Permit, or stockpiled within the ROW or another mineral mining site for future disposal by the BLM.
- **Solar Array Assembly:** Solar array assembly would include mobilization of material and equipment to individual solar array block areas; preparation of trenches, installation of underground cable, and backfill of trenches; installation of posts and table frames for the tracking system; installation of PV modules; connection of electrical terminations; and inspection, testing, and commissioning equipment.
- **Construction of Electrical Collection and Transmission Systems:** The electrical and transmission system systems would include the installation of the DC and SCADA systems; the power and control equipment; the high, medium, and low voltage cables; grounding of all equipment; and installation of communication systems. The overhead 34.5 kV collection system and the 230 kV and 500 kV gen-tie lines would be constructed by using standard transmission line construction techniques.
- **Construction of On-site Substations:** Up to three on-site substations would be constructed through excavation and pouring of a foundation, and installation of electrical equipment, overhead cabling, installation of a control building, and installation of all auxiliary systems (e.g., heating, ventilation, lights).
- **Construction of Auxiliary Systems and Infrastructure:** Internal roadways and transmission access would be constructed through grading, compacting, and leveling. Construction of auxiliary systems and infrastructure, including internal access roads, would occur for the Proposed Action

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and the alternatives but would vary for each; the O&M facilities, lighting, fencing, fire protection system, and water storage and delivery system would be the same for the Proposed Action and alternatives.

Construction Water Use, Waste, and Power

An estimated 2,000 acre-feet (247 hectare-meters) of water would be required over the Project construction period for construction-related activities, including dust control. Limited quantities of hazardous materials would be used and stored on site, and some wastes would be generated. All waste, including batteries, would be properly disposed of or recycled in accordance with regulations and a Waste and Hazardous Materials Management Plan. Spent lithium-ion batteries would be recycled. If a battery cannot be recycled, due to damage or other issues, the battery would be disposed of at an appropriate facility. The types and quantities of hazardous materials and wastes are provided in the POD for the Proposed Action and the *Alternatives Report* (Panorama Environmental, Inc. 2019b) for the alternatives. Similar quantities of hazardous materials are anticipated for the All Mowing Alternative and the Hybrid Alternative. A temporary overhead distribution 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.

Construction Method, Workforce, Equipment, and Schedule

Construction activities would generally occur between 5:00 a.m. and 5:00 p.m. up to 7 days per week for the Proposed Action and the alternatives. The on-site construction workforce would consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The on-site construction workforce size would vary for the Proposed Action and alternatives, although the peak of up to 900 workers at any given time would be the same. Most construction staff and workers would commute daily to the Project site from within Clark County, primarily from the Las Vegas area.

The Project schedule would be phased over several years. Commencement of construction on a portion of the site could occur in October 2019. If the timing is not met to start in October 2019, construction of the first phase would begin January 2020. Phase I could come on-line in 2021, with final completion of Phase II as early as 2022 but no later than December 2023. Construction equipment and schedule would vary for the Proposed Action and alternatives.

Operation and Maintenance

Operation of the Project would create 19 permanent positions (Applied Analysis 2019). The solar power plant would be operated remotely 7 days per week using automated facility controls and monitoring systems with SCADA control systems. Operations staff would be located off site, with daily site visits for security, routine inspection and maintenance, and repairs. At designated intervals, approximately every 10 to 15 years, major equipment maintenance would be performed. O&M procedures would be consistent with industry standards and practices for maintaining plant components for as long as acceptable, to reduce waste.

Routine inspection and maintenance activities, including the frequencies, are shown in the POD and *Alternatives Report* (Panorama Environmental, Inc. 2019b). PV panel cleaning would occur as needed to maintain energy generation performance. PV array cleaning may occur approximately two times per year and could take approximately 24 hours to complete (including nighttime panel cleaning). Water would not be needed to clean solar PV panels. Cleaning would occur by manual methods using brushes and air or using robotic systems. The Project would require up to 20 acre-feet (2.5 hectare-meters) of water per

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year for O&M facilities (e.g., worker subsistence, sanitation, fire protection). Project roads and the O&M area would be maintained free of vegetation.

Vegetation management would be required to control vegetation and prevent the spread of non-native and noxious weeds. Vegetation management would occur through mechanical (i.e., mowing, disking) and BLM-approved chemical controls (i.e., herbicides). The use of herbicides would fall under the Programmatic EIS (PEIS) for the BLM's Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States (BLM 2016c), which is tiered from the PEIS for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (BLM 2007). A Pesticide Use Proposal (PUP) that would be prepared for the Project would provide the specifications for herbicide application, including the type of herbicide(s) proposed for use, method of application, and quantities of herbicide. Only herbicides and applications approved in Nevada and included in the Record of Decisions (RODs) for the PEISs would be used. Additionally, the types of herbicides allowed varies between the Proposed Action and the alternatives, as only some of the approved herbicides are allowed in areas where the herbicide could come into contact with desert tortoises. Herbicide use would be conducted in accordance with BLM Manual 9011: *Chemical Pest Control* and BLM Handbook H-9011-1: *Chemical Pest Control. Standard Operating Procedures* or herbicide use (included as an attachment to the POD) would be implemented. Herbicide use is addressed throughout this EIS.

The Applicant would implement a Site Restoration Plan and an Integrated Weed Management Plan that specifies procedures for managing vegetation and reducing the spread of non-native and noxious weeds, including use of herbicides. The plans would be submitted to BLM for review and approval prior to receiving an NTP.

Decommissioning and Site Reclamation

The objective of project decommissioning and reclamation is to remove the installed power generation equipment and to encourage revegetation of native species, as feasible. The Applicant would prepare and implement a Decommissioning Plan that addresses removal of structures and site restoration in conformance with BLM requirements. The plans would be required for the Proposed Action and alternatives, although the extent of restoration needed would vary.

2.2.2 Project Elements Unique to the Proposed Action

The elements of the Project specific to the Proposed Action are described here.

Project Components

- Solar arrays would be located within development areas A, B, C, D, and E (Figure 2-3) and the solar facility (including gen-tie lines) would have a total acreage of 7,097 (2,872 hectares) (Figure 2-3).
- 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.
- A roadway system consisting of an internal grid and perimeter roadways, graded and covered in aggregate (4 inches [10 centimeters] in depth) or compacted soil (12 inches [30.5 centimeters] of recompacted native material) would be developed. Internal access roads would be 20 feet wide (6 meters wide) spaced approximately 1 mile apart. A utility corridor would be installed, which

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would require 10 feet on one side of the internal access road and 20 feet on the other side. The internal access road system for the Proposed Action is shown in Figure 2-3.

- Desert tortoise exclusion fencing would be placed around the entire Project perimeter.
- Drainage control structures would be installed, including a detention basin, soil cement channels, and riprap or cement bank protection/berms (Figure 2-17).

Construction Method, Equipment, Workforce, and Schedule

Site preparation would include removal of vegetation and the compaction of the soil surface across the Project site. Site preparation would be performed using methods typical for a utility-scale solar development in the Project region, referred to as "disk and roll" (e.g., traditional construction methods) and would result in the loss of all vegetation within the solar field and the compaction of soils. Dust palliatives may be used under the Proposed Action. Construction equipment and a detailed schedule are provided in the POD. The Project would be constructed in two phases. The first phase of construction (Phase I) would include the northern portion of the Project site, including development areas A, a portion of B, C, a portion of D, and E. Phase II would include the southern portions of the development areas B, and D. Phasing is shown in Figure 2-18. Staging would generally be confined to graded areas such as access roads and the O&M building, as well as at gen-tie pole locations (also shown in Figure 2-18). 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 for the Proposed Action.

Operation and Maintenance

Revegetation of native plant species would be allowed to occur, but due to the desert environment, natural revegetation by native species would be slow and is unlikely during the 30-year operational period of the Proposed Action. An intensive weed management effort would need to be implemented under this alternative.

2.2.3 Project Elements Unique to the All Mowing Alternative

The elements of the Project specific to the All Mowing Alternative are described here.

Project Components

- Solar arrays would be located within development areas A, B, B1, B2, C, D, E, and G and the solar facility (including gen-tie lines) would have a total acreage of 7,115 acres (2,879 hectares) (Figure 2-19).
- Solar panels would have a maximum height of 15 feet (3.7 meters) above the ground surface. When the panels are in their most vertical position, approximately 2 to 2.5 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.
- A roadway system consisting of an internal grid, of compacted soil (12 inches [30.5 centimeters] of recompacted native material), where needed according to engineering, aggregate would be applied (4 inches [10 centimeters] in depth). Internal access roads would be up to 15 feet wide (6 meters wide) and spaced approximately every 0.25 mile (0.4 kilometer). A 15-foot-wide utility corridor would be adjacent to every fourth access road in the mowed areas for underground utility conduits. The internal access road system for the All Mowing Alternative is shown in Figure 2-19; the perimeter road would be limited.
- Desert tortoise exclusion fencing around the substations; perimeter fencing would be lifted 8 inches (20 centimeters) off the ground to allow for movement of desert tortoise.

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Construction Method, Equipment, Workforce, and Schedule

The entire solar field would be constructed using mowing under the All Mowing Alternative. The Project would also be constructed in two phases under this alternative. The first phase of construction (Phase I) would include development areas A, B1, the northern portion of B, C, the northern portion of D, and E. Phase II would include development areas G, the southern portion of B, B2, and the southern portion of D. Phasing for the All Mowing Alternative is shown in Figure 2-20. Staging would be confined to graded areas such as access roads and the O&M building, as well as at gen-tie pole locations (also shown in Figure 2-20). Site preparation would include mowing vegetation instead of removal through disk and roll; vegetation would be mowed to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters) where justified. Mowing and panel construction would occur using skid steer vehicles or other tracked vehicles such as loaders, skid steers, cranes, and graders (to level areas for PCSs and battery storage). Tracked vehicles would be used to minimize soil disruption. A flail-type mower mounted on skids that are mounted on a low-ground pressure tractor, approximately 5 to 6 pounds per square inch (psi) (34 to 41 kilopascals), is an example of this type of equipment (Figure 2-21). A rubber-tracked skid steer or a steel-tracked excavator could also be used. These vehicles typically have a footprint of approximately 4 feet (1.2 meters) per track. One vehicle can likely access two solar array rows at a time so approximately 8 feet (2.4 meters) of vegetation would be crushed every 40 feet (12 meters) in a worst-case scenario in the mowed areas. From three to 10 passes are needed to install each set of solar array rows. Passes are typically needed to install pile posts, to install racking and tracker system, to install the panels, to wire the panels, and then to restore any surface along the route, as needed. 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 in the solar array areas that could affect the operation of the solar panels, that is not crushed or removed by grading on the Project site, would be mowed. Dust palliatives would not be used.

Similar workforces in both worker type and number would be required for construction of the All Mowing Alternative, with the same peak workforce of 900. The construction schedule, however, could require up to 40 percent more labor or 40 percent more equipment for construction as compared with areas constructed using traditional methods. Little data are available on the increased labor required to construct mowed areas because few projects have been constructed using these methods. The up to 40 percent increase in labor or equipment 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 that access must remain on access roads located 0.25 mile (0.40 kilometer) 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; and
- The need to potentially perform more work by hand due to reduced accessibility of large equipment that can perform work more quickly.

Even with a 40 percent increase in labor, the peak number of workers on site at any one time would remain at 900. The duration of construction would be similar to the Proposed Action, assuming an increase labor.

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Operation and Maintenance

The solar field would need to have vegetation periodically mowed or trimmed to a height of 18 to 24 inches. Vegetation under the solar arrays would be cut or trimmed with motorized equipment during the winter or by hand during panel cleaning to a height that 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 and would not be performed all at once (that is, a few portions of the site would be mowed each year). Each area would not likely need mowing more than once every 5 or more years. Herbicides that are believed to have deleterious effects on reptiles, such as 2,4-D, would not be allowed under the All Moving Alternative. The allowed herbicides are identified in the Southern Nevada District Office Programmatic Biological Opinion (File No. 84320-2010-F-0365.R038) and include aminopyralid, clopyralid, imazapyr, imazapic, glyphosate, metasulfuron methyl, and rimsulfuron. Aminopyralid would not be used within areas of Nye milkvetch or threecorner milkvetch habitat.

2.2.4 Project Elements Unique to the Hybrid Alternative

The elements of the Project specific to the Hybrid Alternative are described here.

Project Components

- Solar arrays would be located within development areas A, B, B1, C, D, and E and the solar facility (including gen-tie lines) would have a total acreage of 7,063 (2,858 hectares) (Figure 2-22).
- Solar panels in mowed areas would have a maximum height of 15 feet (3.7 meters) above the ground surface; when the panels are in their most vertical position, approximately 2 to 2.5 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. Solar panels in areas constructed using traditional development methods would have a 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.
- A roadway system consisting of an internal grid, would be constructed of compacted soil (12 inches [30.5 centimeters] of recompacted native material) and, where needed according to engineering, aggregate would be applied (4 inches [10 centimeters] in depth). In mowed areas internal access roads would be up to 15 feet wide (6 meters wide) and spaced approximately every 0.25 mile (0.4 kilometer). A 15-foot-wide utility corridor would be adjacent to every fourth access road in the mowed areas for underground utility conduits. The internal access road system for the Hybrid Alternative is shown in Figure 2-22; the perimeter road would be limited.
- Desert tortoise exclusion fencing would be placed around the substations and around all areas developed using traditional methods. Tortoise guards would be placed at all road access points where desert tortoise-proof fencing is interrupted to exclude desert tortoises from the Project footprint. Gates or tortoise exclusion guards would be installed with minimal ground clearance and shall deter ingress by desert tortoises. Perimeter fencing around mowed areas would be lifted 8 inches (20 centimeters) off the ground to allow for movement of desert tortoise.

Construction Method, Equipment, Workforce, and Schedule

Under the Hybrid Alternative, approximately 65 percent of the solar arrays would be constructed using mowing for a total of approximately 4,460 acres (1,805 hectares). The remaining 35 percent would be constructed using traditional construction methods for a total of approximately 2,351 acres (9451 hectares). The Project would be constructed in two phases. The first phase of construction (Phase I) would

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include the northern portion of the Project site, including development areas A, a portion of B, B1, C, a portion of D, and E. Phase II would include the southern portions of the development areas B, and D. Phasing is shown in Figure 2-23. Staging would be confined to graded areas such as access roads and the O&M building, as well as at gen-tie pole locations (also shown in Figure 2-23). In mowed areas, mowing and panel construction (including construction methods, equipment, workforce, and schedule) would occur as described for the All Mowing Alternative. In traditional development areas, mowing and panel construction (including construction methods, equipment, workforce, and schedule) would occur as described for the Proposed Action. The duration of construction would be similar to the Proposed Action, assuming an increase labor.

Operation and Maintenance

Project O&M in the mowed areas would be the same as that described for the All Mowing Alternative. Project O&M in the traditional development areas would be the same as described for the Proposed Action. Herbicides that are believed to have deleterious effects on reptiles, such as 2,4-D, would not be allowed under this alternative in mowed areas. The allowed herbicides are identified in the Southern Nevada District Office Programmatic Biological Opinion (File No. 84320-2010-F-0365.R038), and include aminopyralid, clopyralid, imazapr, imazapic, glyphosate, metasulfuron methyl, and rimsulfuron. Aminopyralid would not be used within areas of Nye milkvetch or threecorner milkvetch habitat.

2.3 No Action Alternative

Under the No Action Alternative, the BLM would not authorize a ROW grant for the Project nor amend the 1998 Las Vegas RMP. No solar field, substation(s), collector routes, gen-tie lines, O&M facilities, or other Project components would be constructed. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP. Any future solar applications for development of the site would be subject to the site-specific conditions identified in BLM's Solar PEIS and the applicable laws and land use plans in place at the time of application.

2.4 Federal Lead Agency Preferred Alternative

Under NEPA, the "preferred alternative" is a preliminary indication of the Lead Agency's preference of action among the Proposed Action and alternatives. A NEPA Lead Agency may select a preferred alternative for a variety of reasons, including the agency's priorities, in addition to the environmental considerations discussed in the EIS. In accordance with NEPA (40 CFR 1502.14(e)), the BLM preliminarily has identified the Hybrid Alternative as the preferred alternative.

2.5 Alternatives Considered but Eliminated from Detailed Analysis

Several alternative sites, technologies, and methods were considered but eliminated, as described in Table 2.5-1. Additional information on the alternatives considered but eliminated are provided in the *Alternatives Report* (Panorama Environmental, Inc. 2019b).

Table 2.5-1 Summary of Alternatives Considered but Eliminated from Detailed Analysis

Alternative	Description
Site Alternatives	
Private Land Alternatives	Much of the available private land in the region is parceled and served by nearby utility systems to accommodate higher-intensity industrial uses, which renders the land too expensive for solar PV development. Additionally, 85 percent of the land in Nevada is

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Alternative	Description
	owned by the federal government, which limits the amount of available private land for development.
Other BLM-Administrated Land Alternatives	Much of BLM-administered land in the areas with the highest solar energy production potential is precluded from development by special designations such as Areas of Critical Environmental Concern (ACEC), Desert Wildlife Management Areas (DWMA), and wilderness. Many potentially suitable areas outside these designated areas are precluded because they are in use by or are proposed for other energy projects (primarily solar) or have other constraints, including potential impacts on desert tortoise and other wildlife, military operations, and floodplain and jurisdictional waters.
Brownfield/Degraded Land Alternatives	The USEPA tracks 480,000 contaminated sites for potential reuse for renewable energy development as part of its RE-Powering America’s Lands Initiative. As with the private land alternatives previously described, it would be technically possible to develop solar energy on these contaminated sites. However, there were no identified sites in the region that would be sufficiently large enough to support a 690-MW project with appropriate access to transmission lines and substations with adequate capacity.
Other Types of Renewable Energy - Solar, Wind or Geothermal	Other types of renewable energy projects, including wind, geothermal, and other solar technologies, were eliminated from detailed consideration because they would not meet the BLM’s purpose and need to respond to the Applicant’s application. BrightSource’s 2008 SF 299 application included a request for a ROW grant to develop a solar-thermal renewable energy power generation facility. A solar thermal project was eliminated for economic reasons as well as having greater environmental impacts with respect to biological resources, including birds; water consumption, as mirrors require washing; and visual impacts associated with glare from the mirrors and the high visibility of the 450-foot (137-meter) power towers (BrightSource Energy Inc. 2008).
Distributed Generation	Distributed generation solar also was eliminated from detailed consideration. Distributed generation refers to the installation of small-scale solar energy facilities at individual locations at or near the point of consumption (e.g., use of solar PV panels on a business or home to generate electricity for on-site consumption). Distributed generation systems typically generate less than 10-MW.
Demand Side Management	This potential alternative to utility-scale solar PV energy development consists of a variety of approaches to reduce electricity use, including energy efficiency and conservation, building and appliance standards, and load management and fuel substitution. With population growth and increasing demand for energy, conservation and demand-side management alone is not sufficient to address energy needs. These efforts also do not respond to federal mandates to promote, expedite, and advance the production and transmission of environmentally sound energy resources, including renewable energy resources and, in particular, cost-competitive solar energy systems at the utility scale.
Concentrated Photovoltaic Technology	Concentrated PV (CPV) technology uses layers of wafers to absorb different wavelengths of sunlight and provide more power conversion efficiency than typical PV panels. This technology requires dual tracking technology to provide critical alignment with direct sunlight in order to be efficient. CPV is mounted on taller structures than traditional PV (as high as 40 feet [12 meters] above the surface). Because this technology is relatively new, there are risks for long-term performance reliability. The manufacturing capacity to supply large-scale utility projects has not been proven to date.

Chapter 3 Affected Environment and Environmental Consequences

3.0 Introduction

3.0.1 Affected Environment

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources that have the potential to be affected by activities related to the Proposed Action and alternatives described in Chapter 2: Proposed Action and Alternatives. The affected environment is presented for the Project area, including areas that encompass all ancillary facilities (e.g., access roads, gen-tie lines). Resources addressed include those that occur within, are adjacent to, or are associated with the Proposed Action and alternative analysis area (referred to as the study area for select resource topics). The affected environment establishes the baseline from which environmental effects are assessed. Figures referenced in this chapter are found in Appendix D to this EIS.

3.0.2 Environmental Effects

This chapter also presents the environmental effects of the Proposed Action and alternatives. Many concepts and terms are used when discussing impacts that may not be familiar to the average reader. The terms “effect” and “impact” are synonymous in NEPA documents. Refer to 40 CFR 1508.8 for definitions of direct and indirect effects, and 40 CFR 1508.27 for definition of significance and severity of impact.

3.0.3 Mitigation Measures Identified in the Analysis

Mitigation measures (MMs) are proposed, where applicable, based on potential for adverse effects from the Project. Each mitigation measure is presented first with “MM” followed by an acronym for the applicable resource topic; for example, “MM-LU” would be a mitigation measure to address a land use impact. Mitigation measures are solutions to environmental impacts that reduce the intensity of or eliminate the impacts. Mitigation measures are designed to be adequate and effective in accordance with CEQ regulations (40 CFR 1508.20).

The environmental analysis and documents produced in the NEPA process should provide the decision-maker with relevant and timely information about the environmental effects of the decision and reasonable alternatives to mitigate these impacts.

3.0.4 Cumulative Effects

Overview

The cumulative analysis addresses the potential for cumulative impacts in the vicinity of the Project in Clark County, Nevada. The CEQ guidelines for implementing NEPA define cumulative impacts as environmental impacts resulting from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are considered without regard to the agency (federal or non-federal), organization, or person that undertakes them. The cumulative effects analysis is accomplished through the following steps:

- Establish the geographic scope for the analysis.
- Establish the time frame for the analysis.

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- Identify the significant cumulative effects associated with the Project and alternatives in conjunction with the cumulative projects.
- Provide a cumulative effects analysis and discussion.

Geographic Extent and Time Frame for Cumulative Analysis

The geographic extent of the cumulative impact analysis for potentially affected resource topics evaluated near the Project site is provided in Table 3.0-1, and the projects are shown in Figures 3.0-1 and 3.0-2. The geographic extent of impacts might vary based on the nature of the resource being evaluated and the distance at which an impact might occur (for example, the evaluation of air quality may have a greater regional extent of impact than visual resources). BLM, United States Fish and Wildlife Service (USFWS), National Park Service (NPS), Department of Defense (DoD), and Moapa Band of Paiutes administer most of the land around the Project site. The geographic extent for the cumulative analysis is provided in Figure 3.0-3.

Table 3.0-1 Geographic Extent of the Cumulative Effects Analysis by Resource Topic

Resource Topic	Geographic Extent	Explanation
Geology and Acoustics	Within and adjacent to the Project site	These resources have localized effects that do not generally combine or accumulate regionally. Cumulative effects are not likely to occur beyond the immediate area of effect. For example, noise diminishes quickly and would not combine with noise from projects more than a few thousand feet away.
Soils, Water Resources, and Jurisdictional Waters	Watershed; Lower White River Flow System for groundwater	Impacts from other projects within the same areas surface hydrologic connectivity and within the connected groundwater system could accumulate. Soil destabilization and erosion from other projects in the same areas of surface water hydrologic connectivity could occur downstream.
Wildlife and Special Status Species, Vegetation; Mojave Desert tortoise	Within a 50-mile (80-kilometer) radius of the Project site and within the Northeastern Mojave Recovery Unit for Mojave desert tortoise	Projects within this distance would be expected to affect similar vegetation, habitat, and wildlife. This distance generally accounts for the area within which a similar population of a species or habitat could occur. Projects within the same recovery unit would affect habitat necessary to conserve the genetic, behavioral, morphological, and ecological diversity necessary for long-term sustainability of the species.
Land Use, Recreation, Air Quality, Socioeconomic, Environmental Justice, Public Health and Safety; and Mineral Resources	Clark County	These resources tend to have overlapping regional impacts. Clark County is the logical administrative unit to assess cumulative impacts from projects.
Climate Change	Nevada and California	Climate change is a global phenomenon. Cumulative impacts were considered for the states where the renewable energy from the solar facility could offset emissions from carbon-based energy generation sources.

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Resource Topic	Geographic Extent	Explanation
Visual Resources, Cultural Resources, Paleontology, Native American Concerns, Old Spanish National Historic Trail	Within 25-mile (40-kilometer) radius of Project site	Projects within this distance could result in adverse impacts on the same types of visual, cultural, historic Native American, or paleontological resources. Resources within this distance are more likely to originate from the same ethnographic group or from the same timeframe based on geologic formations or history.
Transportation	Regional and local roadways (I-15, Valley of Fire Road, State Route [SR] 169)	Projects that use the same roadways would have the potential for cumulative effects.

The time frame of this cumulative impacts assessment appropriately includes activities that are ongoing and would occur up to 30 years in the future (the general time frame for Project operation) followed by restoration activities, but little or no information is available for projects that could occur farther than 5 to 10 years in the future, as such projects may not yet have been conceived or might not have started the planning process. Past projects are only included to the extent that they are ongoing and, therefore, having some impacts. For example, the Playa Solar Project is a past project, but it is ongoing in its operation, and as such could have cumulative impacts when considered with the Project.

Past, Present, and Reasonably Foreseeable Future Actions

The cumulative scenario includes all actions related to renewable energy, transportation, infrastructure improvement, pipeline and electric transmission, and other large-scale, near-term plans that meet the following criteria:

- Actions for which environmental documents are in preparation or finalized
- Actions in a detailed design or planning phase
- Actions approved but not yet under construction (e.g., published NOIs, funding for construction)
- Actions approved and under construction
- Actions in the bidding or research phase that are reasonably likely to be proposed

The actions⁴ described in Table 3.0-2 are those that are ongoing or reasonably foreseeable and could result in cumulative impacts.

⁴ (174 Power Global 2019, Armantrout 2017, BIA 2015, BIA 2013, BLM 2012a, BLM 2013, BLM 2008b, BLM 2014b) (BLM 2015a, BLM 2014c, BLM 2014d, BLM 2016a, BLM 2014e, BLM 2012b, BLM 2010b, BLM 2009, BLM 2010c) (BLM 2010d, BLM 2018b, Clark County 2018, Clark County n.d., First Solar 2018, Gilroy 2018, NextEra Energy, Inc. 2016, NDOT 2018) (SEC 2011, Solar Energy Zones n.d., Streater 2018, SunPower 2019, USAF 2011, Vrobison 2018) (BLM 2010a, USAF 2006, National Agriculture Imagery Project 2017) (Severts 2018a, 8minutenergy Renewables 2018, BLM 2018a, Crescent Peak Renewables, LLC 2017, NDOT n.d.) (Choquette 2018, MVProgress 2018, NV Energy 2018, Severts 2018b, Brean 2018a) (Brean 2018b, Laura 2018, Patterson 2018a, Horn 2018, Harmon 2018, 99 ABW Public Affairs 2018, Patterson 2018b) (BOR 2016, Blazi 2018, BIA 2013, BIA 2015, BLM 2018c, NextEra Energy, Inc. 2016, Power Technology 2019)

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Table 3.0-2 Cumulative Projects in the Project Area

Number	BLM Serial Number	Project Name	Project Type	Approximate Size	Status
1.	N-93321	Harry Allen Solar Energy Center Project (130-MW)	Energy	715 acres (289 hectares)	Operational by the end of 2020.
2.	N-88313	Apex Solar Project (20-MW)	Energy	156 acres (63 hectares)	Constructed
3.	N-93306/ N-94479	Playa Solar Project (200-MW)	Energy	1,700 acres (688 hectares)	Constructed
4.	N/A	Nellis Air Force Base Area III Solar Project (14.2-MW)	Energy	140 acres (57 hectares)	Constructed
5.	N/A	Nellis Air Force Base Area I Solar Project (15-MW)	Energy	160 acres (65 hectares)	Constructed
6.	N/A	Moapa Solar Project (250-MW)	Energy	2,000 acres (809 hectares)	Constructed
7.	N/A	Moapa Solar Energy Center (200-MW)	Energy	850 acres (344 hectares)	Not constructed
8.	N-93337	Dry Lake Solar Energy Center Project (150-MW)	Energy	694 acres (281 hectares)	Predevelopment phase
9.	N-93586	Dry Lake Solar Energy Center at Harry Allen (20-MW)	Energy	155 acres (63 hectares)	Construction will occur over 12 to 24 months; Predevelopment phase
10.	N-95554	Dry Lake East Solar Designated Leasing Area Project	Energy	1,800 acres (728 hectares)	NOI released April 13, 2018
11.	N-93564	Aiya Solar Project (100-MW)	Energy	900 acres (364 hectares)	Project is paused due to lack of financing; Construction will occur over 12 months
12.	N-97443	Eagle Shadow Mountain Project (300-MW)	Energy	2,200 acres (890 hectares)	Anticipated operation on December 31, 2021
13.	N-90395	Techren I-V Project (50-MW)	Energy	2,300 acres (931 hectares)	Anticipated operation on December 31, 2020
14.	N/A or not available	Copper Mountain Solar 5 Project (250-MW)	Energy	1,200 acres (486 hectares)	Anticipated operation on December 31, 2021
15.	N-90788	Yellow Pine Solar Project (250-MW)	Energy	9,290 acres (3760 hectares)	NOI released June 1, 2018

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Number	BLM Serial Number	Project Name	Project Type	Approximate Size	Status
16.	N/A	I-15/United States Route 93 (US 93) Garnet Interchange & US 93 Capacity Improvements	Transportation	7.7 miles (12.4 kilometers)	Construction Spring 2018 to Winter 2018
17.	N/A	I-15/ Clark County 215 Northern Beltway Interchange	Transportation	15 miles (24 kilometers)	Construction 2019 to 2022
18.	N-82076	One Nevada Transmission Line Project (ON Line Project)	Transmission	236 miles (380 kilometers)	Constructed and operational
19.	N-86359	Harry Allen to Eldorado 500 kV Transmission Line Project (formerly known as the Southern Nevada Intertie Project [SNIP])	Transmission	60 miles (97 kilometers)	Construction will occur over 12 to 24 months; In service by 2020
20.	N-86357	Eastern Nevada Transmission Project	Transmission	54 miles (87 kilometers)	Construction will occur over 24 months; In service between 2018 and 2020
21.	N-86732	TransWest Express Transmission Project	Transmission	725 miles (1,167 kilometers)	Construction will occur from 2020 to 2022.
22.	N/A or not available	Reid Gardner Generating Station	Power Plant	480 acres (194 hectares)	Completion of demolition in 2019 and restoration in 2023.
23.	N/A or not available	UNEV Gas Pipeline Project	Pipeline	3882 acres (1570 hectares)	Constructed
24.	N-78803	Clark, Lincoln, and White Pine Counties Groundwater Development Project	Water	180,000 acre-feet of water (0.2 cubic kilometers) per year	Permitting and legal activities remain underway
25.	N-48857	Coyote Springs Investment Development Project	Development	42,800 acres (17,320 hectares)	Project is paused due to lack of water rights
26.	N/A	Clark County Public Lands Proposal	Land Use	400,000 acres (161,874 hectares)	Draft Proposal has been prepared
27.	N-85801	Silver State South Solar Project (250-MW)	Energy	2,000 acres (809 hectares)	Constructed and operational
28.	N-85077	Silver State North Solar Project (50-MW)	Energy	620 acres (251 hectares)	Constructed and operational
29.	N-87836	Ivanpah Valley International Airport Project	Development	6,000 acres (2,428 hectares)	Studies initiated to move forward with the project

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3.1 Land Use

3.1 Land Use

3.1.1 Affected Environment

Introduction

This section addresses lands and realty, specially designated areas, rangeland resources, and military and civilian aviation. Additional information is included in the *Land Use and Corridor Report* (Panorama Environmental, Inc. 2019e). Regulations and laws that apply to the Project are included in Appendix E.

Analysis Area

The area of analysis for each type of land use considered here differs. The area of analysis for land and realty is the extent of land that could be directly or indirectly affected by the Project, such as lands subject to an applicable BLM ROW, permit, lease, or easement; a designated transmission corridor; or some other land authorization. The area of analysis for specially designated areas and lands with wilderness characteristics is the extent of land that could be directly or indirectly affected within approximately 25 miles (40 kilometers) of the Project site. An approximately 15-mile (24-kilometer) area of analysis was used to address rangeland resources. A 50-mile (80-kilometer) area of analysis was used to describe baseline conditions of military and civilian aviation for the Project area.

Baseline Description

Lands and Realty

A preliminary title search and land survey identified land use authorizations in the Project area, in addition to the Applicant's application for a solar energy ROW to BrightSource Energy, LLC (Fidelity National Title Group 2018, HERServices 2018). These land use authorizations are listed in Table 3.1-1 and shown in Figure 3.1-1. No active or pending mining claims are within the 44,000-acre (17,806-hectare) ROW application area (EnviroMINE 2018). Transportation corridors, roads, and highways in the Project area include I-15, Valley of Fire Road, BSBCB, Old Spanish Trail Road, and an alignment of the Union Pacific Railroad (shown in Figure 3.1-1). Energy and utility corridors in the Project area include a Section 368 Energy COC (39-113) and Black Mountain – Crystal utility corridor (Shown in Figure 3.1-2).

Table 3.1-1 Land Use Authorizations in the Project Area

Name	Type of ROW Authorization	ROW Holder/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	Los Angeles Department of Water and Power (LADWP) (formerly Department of Water and Power of the City of Los Angeles)	N-4790; 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	N-89176

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3.1 Land Use

Name	Type of ROW Authorization	ROW Holder/Applicant	BLM Serial Number
		Moapa Solar LLC); City of Los Angeles	
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 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	N-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	TransWest Express LLC	N-86732
--	Underground telephone line	CenturyLink, Inc.	N-57781
I-15	Interstate highway	Nevada Department of Transportation	N/A
SR 40	Roadway	BLM Road	N/A
Route 167	Roadway	BLM Road	N/A
Valley of Fire Road	Roadway	BLM/County Road	N/A
Old Spanish Trail Road	Roadway	BLM Road	N/A
BSBCB	Roadway	BLM/County Road	N/A
Union Pacific Railroad	Railroad	Los Angeles and Salt Lake Railroad Company	CC-00360
Note:			
¹ . Approved for construction and operation.			

Specially Designated Areas

ACECs. Eight existing ACECs are within 25 miles (40 kilometers) of the Project site (refer to Figure 3.1-3). The closest ACEC is Hidden Valley ACEC, which is located approximately 3.3 miles (5.3 kilometers) southeast of the Project site.

National Wildlife Refuges. The Desert National Wildlife Refuge Complex is located approximately 8 miles (13 kilometers) northwest of the Project site (refer to Figure 3.1-3). At 1.6 million acres (0.65 million hectares), the Desert National Wildlife Refuge is the largest refuge in the continental United States and the largest protected area in Nevada (USFWS 2009). Moapa Valley National Wildlife Refuge is located approximately 15 miles (24 kilometers) north of the Project site (Figure 3.1-3). Moapa Valley National Wildlife Refuge is composed of approximately 116 acres (187 kilometers) of land situated along the Muddy River.

National Historic Trail: The only national historic trail in Southern Nevada is the Congressionally designated OSNHT. The trail and its variants make up a 2,700-mile (4,345-kilometer) route that extends from Santa Fe, New Mexico, to Los Angeles, California, and passes through New Mexico, Colorado,

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3.1 Land Use

Utah, Arizona, Nevada, and California. Detailed information about the OSNHT can be found in Section 3.14: Old Spanish National Historic Trail.

National Scenic Byways: Three scenic byways are located within 25 miles (40 kilometers) of the Project site: BSBCB, Valley of Fire Road State Scenic Byway, and White Domes Road State Scenic Byway (refer to Figure 3.1-3). BSBCB is a BLM-designated scenic byway that includes approximately 24 miles (39 kilometers) of high clearance, four-wheel drive roadway in highly scenic geologic formations and abandoned historic mining sites. The BSBCB in the Project area runs roughly north to south from Valley of Fire Road, passes through the Muddy Mountains, and meets Northshore Road in the Lake Mead National Recreation Area.

Wild and Scenic Rivers: No designated Wild and Scenic Rivers are in Nevada (BLM 2018c). Three of the eligible rivers are located within 25 miles (40 kilometers) of the Project site to the northeast: Muddy River (20.4 miles [32.8 kilometers] long), Meadow Valley Wash (15.3 miles [26.2 kilometers] long), and Virgin River (21.6 miles [35 kilometers] long).

Wilderness Areas and Wilderness Study Areas: Seven designated wilderness areas are within 25 miles (40 kilometers) of the Project site (refer to Figure 3.1-3).

Land with Wilderness Characteristics

The most recent inventory for Land with Wilderness Characteristics within all BLM-managed land in Southern Nevada was completed by BLM in 2010 and 2011. The Project site does not meet the conditions for consideration as possessing wilderness characteristics.

Rangeland Resources

The Project site is not located on land designated as having rangeland resources, including herd management areas or livestock grazing allotments. A burro herd area is located approximately 3.5 miles (5.6 kilometers) south of the Project site in the Muddy Mountains. One open but inactive grazing allotment (Muddy River) and two closed grazing allotments (White Basin and Arrow Canyon) are located between approximately 3.8 to 12.5 miles (6.1 to 20.1 kilometers) from the Project site.

Military and Civilian Aviation

The FAA is responsible for regulating civil aviation, including the oversight of air traffic and aeronautical obstructions. The United States military and other government agencies use airspace that is important for training and operations, some of which occurs at low altitudes (from 1,000 feet [305 meters] to as low as ground surface). These areas include military training routes (MTRs) and special use airspaces (SUAs), including military operations areas, which cover about 37 percent of federal land in the western United States.

Ten registered airports (including airfields) are within 50 miles (80 kilometers) of the Project site (refer to Figure 3.1-4). The Project site is not located within an airport sphere of influence or any restricted airspace or designated route. The closest restricted military airspace is located approximately 17 miles (27 kilometers) southeast at Nellis Air Force Base (AFB), one of the largest fighter bases in the world, and roughly 28 miles (45 kilometers) west at the Nellis Air Force Range, a military training and testing facility (refer to Figure 3.1-4). The closest military training route is located approximately 20 miles (32 kilometers) north of the Project site.

BLM and other federal or state agencies conduct low-level flights in the region for fire operations, wild horse and burro censuses and gathers, wildlife inventories, facility maintenance, or other activities (BLM

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3.1 Land Use

2012a). Aerial operations for resource management activities are not known to occur in the immediate Project area, nor are any aerial training activities. In the event of a wildland fire in the Project area, aerial firefighting operations could occur below an altitude of 500 feet (152 meters) above ground level (AGL) for the deployment of smokejumper crews, water and fire retardants, and miscellaneous para-cargo (BLM, NPS, USFWS, BIA, USFS 2018).

3.1.2 Environmental Consequences

Proposed Action

Lands and Realty

Land Use Authorizations. Under the Proposed Action, the Project could conflict with existing land use authorizations. The Project's gen-tie lines have the potential to create safety conflicts with existing and proposed transmission lines where the lines must cross (Smith and Albert 2018), including the Crystal-Moapa 500 kV Line, the Navajo-McCullough 500 kV Line, the IPP DC Line, and the TransWest Express Transmission Project (Figure 3.1-1). The heights of the transmission lines must be engineered such that the crossings meet safety requirements for separation. Safety precautions may require the Project's gen-tie lines be constructed with heights in excess of 200 feet to avoid conflicts with existing transmission lines. All planned structures taller than 199 feet AGL require an obstruction evaluation as prescribed by the FAA. A copy of this evaluation must be provided by the Applicant to BLM.

Construction of the approved transmission projects and the Project could also conflict due to overlapping construction schedules that could create added congestion or traffic safety concerns related to access or staging of materials. To avoid adverse effects during construction and operation of the Project, MM Land Use (LU)-1 would be implemented, which requires coordinating construction activities and coordinating to ensure that Project transmission lines are designed to meet requirements for separation distances between the lines. The northern gen-tie line would also cross the underground telephone cable ROW parallel to I-15. MM LU-2 would require coordination with CenturyLink to avoid adverse effects, such as impacting the buried lines in a way that could disrupt service. Other authorizations included closed oil and gas leases in the Project area (Figure 3.1-1). Since these leases are closed and no productive oil was found, no impacts would occur.

Transportation Corridors. The Proposed Action would temporarily affect transportation corridors where the 230 kV and 500 kV gen-tie lines would cross I-15 and the Union Pacific railroad before entering Crystal Substation. Support structures for the gen-tie lines would be installed outside of the highway and railroad corridor, and suspended conductor would not impede travel. Brief closures of I-15 and the railroad are expected during construction (installation) and decommissioning (removal) of the overhead conductor that crosses the transportation corridors. Temporary closures are necessary for safety purposes. Temporary closures of I-15 and the railroad would be coordinated with the NDOT and Union Pacific, respectively. Holders of valid existing rights that may be affected would be notified in advance of any temporary closures. The necessary encroachment permits, concurrences, and authorizations would be obtained prior to any work within the ROWs. Vehicle traffic on I-15 would be managed according to NDOT encroachment permit requirements and a Traffic and Transportation Plan. Adverse effects on existing transportation corridors are not anticipated because the Applicant would be required under law to obtain the appropriate permissions, approvals, and permits for crossing.

Energy Corridors. Under the Proposed Action, the Project has the potential to affect energy corridors. Solar panels would be installed in approximately 375 acres (152 hectares) of development area D and 3

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acres (1 hectare) of development area E where a Section 368 Energy COC (39-113) is located (refer to Figure 3.1-2). Installing solar panels within the corridor could create an incompatible use that prevents future development of energy infrastructure by occupying the space that would be needed for facilities and access. BLM will decide prior to the Final EIS if construction of solar panels will be allowed through the Section 368 Energy COC (39-113) in development area D. If construction is not permitted in the corridor, then the most southern portion of development area D would be orphaned. All utility connections to the orphaned portion of development area D to the rest of the Project site would need to be underground. Installation of solar panels and associated infrastructure would conflict with possible future transmission lines, which are permitted within the Section 368 Energy COC (39-113). Adverse effects on the energy corridors could occur if the solar facility is developed within the corridor.

Utility Corridors. Under the Proposed Action, the Project has the potential to affect utility corridors where the 230 kV and 500 kV gen-tie lines would cross the Black Mountain – Crystal utility corridor before entering Crystal Substation. The gen-tie lines would be installed to comply with local and federal guidelines for transmission line separation to ensure safety. The gen-tie lines would cross the utility corridor but should not prevent future development within the corridor. Any future development within the utility corridor would be required to comply with the same transmission line separation distances as the Project, and appropriate coordination would occur. Adverse effects on the utility corridors are not anticipated.

Specially Designated Areas

Specially designated areas identified within 25 miles (40 kilometers) of the Project site include both boundary-based features (i.e., parks and conservation areas) as well as linear features (i.e., national trails, byways, and Wild and Scenic Rivers) (refer to Figure 3.1-3). Two linear features are located within the Project site: the OSNHT and BSBCB. All other specially designated areas are sufficiently separated from the Project site to avoid direct impacts or adverse effects. Impacts to the OSNHT are addressed in Section 14: Old Spanish National Historic Trail. Refer to that section for a complete description of effects.

The Proposed Action would not have direct effects on the BSBCB because it would be unimpeded by Project construction and operation. The Project would be visible from the BSBCB, particularly at the end of the byway near development area E, as well as from the byway coming out of the mountains. Visual impacts would be considered low to moderate but adverse (appearing as moderately contrasting with the surrounding landscape) to a short portion of the byway experience. The solar field would appear as a dark line and would not dominate views. Mitigation is included in Section 3.10: Visual Resources and includes MMs Visual Resources (VR)-1 and VR-2, which require surface treatment for Project structures, and MM VR-4, which requires that the solar panels be treated with anti-reflective coating. Visual impacts on the BSBCB would be further reduced by these measures.

Indirect impacts on other specially designated areas, such as the Hidden Valley ACEC and Valley of Fire State Park, could occur through increased traffic and congestion on Valley of Fire Road, primarily during construction (and decommissioning). Valley of Fire Road would be used as the primary access point during all phases of the Project. The road would remain open for Project construction; however, the Project would increase traffic on the road from worker vehicles and haul trucks, between I-15 and the site entrance. Implementation of the required Traffic and Transportation Plan and MM Transportation (TRA)-1, which requires implementing traffic control measures to reduce congestion and delays (refer to Section 3.16: Transportation), would minimize adverse effects on public access to the surrounding specially designated areas.

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Rangeland Resources

The Project site is not located within nor near designated rangeland resources, including herd management areas or grazing allotments. The closest rangeland resources, a burro herd area in the Muddy Mountains and an inactive grazing allotment, are located more than 3 miles (5 kilometers) away. Direct and indirect adverse effects are not anticipated.

Military and Civilian Aviation

Air Space. The Project site is not located in proximity to any airport buffer zones, military training routes, or SUA (refer to Figure 3.1-4). The Project would not conflict with military or civil airspace designations or military training routes due to these separation distances. Tall structures, generally greater than 200 feet (61 meters) aboveground, have the potential to create airspace obstructions.

The Project would involve installation of tall poles and/or towers and suspended conductor for the gen-tie and collector lines. The tallest facilities within the solar development areas would be poles or towers for the collector lines, which would be up to 75 feet (23 meters) AGL or less. Poles or towers for the gen-tie lines would generally be less than 200 feet (61 meters) AGL, although they may need to be taller than 200 feet (61 meters) where the conductor would cross the Union Pacific railroad, I-15, or transmission lines within the Black Mountain – Crystal utility corridor. If gen-tie line poles or towers would exceed 200 feet (61 meters) AGL, the FAA would be notified by filing a Notice of Proposed Construction or Alteration (FAA Form 7460-1), as required by Title 14 Section 77.13 and Instruction Memorandum No. 2001-030 (BLM 2000). The FAA would then conduct an aeronautical study under the provisions of 49 USC, Section 44718 and, if applicable, Title 14 of the CFR, Part 77. If an aviation obstruction is identified, FAA may require that the obstruction is marked or lit according to Advisory Circular 70/7460-1L (FAA 2016). A determination by the FAA regarding the gen-tie facilities would be made prior to publication of the ROD and provided by the Applicant to BLM.

The BLM is responsible for coordinating with DoD and FAA regarding ROW authorizations for solar facilities to ensure tall structures are noted on aeronautical hazard maps for low-level flight operations that may be undertaken by the BLM and other federal or state agencies (BLM 2012a). Adverse impacts would be avoided through the appropriate coordination and planning requirements.

Aviation Emergencies and Dangers from Glint and Glare. An aviation emergency could occur in the Project area due to the presence of Nellis AFB and MTRs located within approximately 20 miles (32 kilometers). During an aviation emergency, pilots operating aircraft in the vicinity of the Project may make an emergency ejection. Pilots could suffer injuries from colliding with solar and electrical facilities installed for the Project, and Project facilities could be damaged by falling aircraft, debris, or pilots during such aviation emergencies. No recommendations are available that could reduce the potentially adverse effects from an aviation emergency; however, the likelihood of such an event is extremely low.

Solar projects have the potential to introduce new sources of glare. The amount of reflectivity varies greatly among solar technologies. With anti-reflective coatings, in accordance with MM VR-4, PV panels reflect as little as 2 percent of the incoming sunlight depending on the angle of the sun, which is roughly the same as water (Transportation Research Board 2011, FAA 2018). Adverse effects would be minimal or unlikely to occur.

Communication System Interference. According to an FAA guide for solar development near airports, solar development could interfere with aviation communication systems by negatively impacting radar, navigational aids, and infrared instruments; however, this interference generally occurs only when objects

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are installed too close to antennas (less than 500 feet [152.4 meters]) or block transmission signals between aircraft or a remote location (Transportation Research Board 2011, FAA 2018). Project facilities would not be installed near aviation communication antennas nor block transmission signals. Adverse effects are not anticipated.

Residual Effects

No residual effects on land authorizations or transportation corridors would occur as coordination, obtaining permissions and authorizations, and implementing design modifications would avoid conflicts. Residual adverse effects could occur on the Section 368 Energy COC (39-113) if solar panels are installed within the corridor. No residual effects on utility corridors are anticipated. Residual effects on specially designated areas would include ongoing indirect visual impacts on the BSBCB during construction and the 30-year operation of the Proposed Action. Residual effects on the OSNHT are discussed in Section 3.14: Old Spanish National Historic Trail. If the capacity of the Section 368 Energy COC (39-113) is reduced through construction of the Project, a residual effect would occur. No residual effects would occur to rangeland resources or military and civilian aviation.

Cumulative Effects

Lands and Realty. Most of the cumulative projects would involve leasing BLM land to allow construction and operation of each project. The Proposed Action in combination with a few of the cumulative projects (#21, #26 from Table 3.0-2) could cause utility conflicts and might prohibit future development within the Black Mountain – Crystal utility corridor. Cumulative impact on the Section 368 Energy COC (39-113) would occur if development of the solar facility is allowed in the corridor, and other projects also develop and remove acreage from this corridor. Construction of the Proposed Action would result in a small conflict with approximately 20 acres (8 hectares) of the Clark County Public Lands Proposal (#26), which includes a proposal for an ACEC that overlaps with development areas D and E. The overlap could be a mapping issue due to the scale. The BLM and Clark County would coordinate regarding the final boundaries of the Project and the ACEC to ensure that overlap is eliminated prior to issuance of a ROW to the Applicant. The Project overlaps with tribal expansion areas, which could limit use of this land, but would not deter the disposal. Potential ROW conflicts would be localized and would not cumulate. Conflicts, such as safety hazards, that could arise from transmission line crossings would be addressed through coordination.

Specially Designated Areas. Many cumulative projects would involve construction of facilities across or within line of sight of specially designated areas, including Coyote Springs ACEC, OSNHT, and BSBCB. Some of the cumulative projects would be constructed simultaneously, thus increasing traffic, congestion, and delays along roadways leading to specially designated areas. The cumulative indirect effect on specially designated areas would be adverse. The Proposed Action would involve construction of a solar facility that would have some limited visibility from the BSBCB, would have adverse effects on the OSNHT, and would contribute to traffic congestion or delays leading to several specially designated areas, including Hidden Valley ACEC and Valley of Fire State Park. MMs VR-1, VR-2, and VR-4 would be implemented to reduce the visual effects of the solar facility, and MM TRA-1 would be implemented to reduce congestion and delays.

Military and Civilian Aviation, and Rangeland Resources. No effect on military and civilian aviation, and rangeland resources would occur. As such, the Proposed Action would not contribute to substantial, adverse cumulative effects on these resources.

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3.1 Land Use

All Mowing Alternative

The All Mowing Alternative would include solar development areas G, B1, and B2, in addition to the much of the development areas included in the Proposed Action. Direct and indirect effects would be the same as with the Proposed Action for land authorizations and transportation corridors and would require the same mitigation. This alternative would avoid adverse impacts associated with development in the Section 368 Energy COC (39-113) because no development would occur in the energy corridor. Direct and indirect effects on specially designated areas would generally be the same as for the Proposed Action and require the same mitigation, but residual indirect effects would remain. Adverse effects to the OSNHT would generally be the same and require the same mitigation as described for the Proposed Action. Rangeland and military and civilian aviation effects would be the same as described for the Proposed Action.

Residual effects would be the same as with the Proposed Action, except this alternative would avoid the Section 368 Energy COC.

Cumulative impacts would also be the same as under the Proposed Action. With implementation of the same mitigation measures, the cumulative contribution on specially designated areas would be minimized. The All Mowing Alternative would not contribute to any other cumulative effect related to land use.

Hybrid Alternative

The Hybrid Alternative includes installation of solar arrays in development area B1, in addition to the development areas identified for the Proposed Action, as well as mowing of approximately 65 percent of the solar array areas. Direct and indirect effects would be the same for land authorizations and transportation corridors and would require the same mitigation as the Proposed Action. Mitigation would be implemented to avoid or minimize conflicts with the Section 368 Energy COC (39-113). Indirect visual impacts on the BSBCB would be the same as with the Proposed Action, and the same mitigation would apply. Adverse effects to the OSNHT would generally be the same and require the same mitigation as described for the Proposed Action. Rangeland and military and civilian aviation effects would be the same as described for the Proposed Action.

Residual effects would be the same as with the Proposed Action.

Cumulative impacts would also be the same as described for the Proposed Action. With implementation of the same mitigation measures, the cumulative contribution on specially designated areas would be minimized. The Hybrid Alternative would not contribute to any other cumulative effect related to land use.

No Action Alternative

The Project would not be developed under the No Action Alternative. No land use effects would occur.

Mitigation Measures

- MM LU-1: Coordination with Transmission Line ROW Holders/Applicants (from Section 3.1: Land Use)
- MM LU-2: Coordination with CenturyLink (from Section 3.1: Land Use)
- MM VR-1: Visual Design Elements (from Section 3.10: Visual Resources)
- MM VR-2: Surface Treatment (from Section 3.10: Visual Resources)
- MM VR-4: Anti-Reflective Coating (from Section 3.10: Visual Resources)

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- MM TR-1: Traffic and Transportation Plan Measures (from Section 3.16: Transportation)

3.2 Recreation

3.2.1 Affected Environment

Introduction

This section addresses the baseline recreational uses in the Project area. Supplemental information is provided in the *Land Use and Corridor Report* (Panorama Environmental, Inc. 2019e). Regulations and laws that apply to the Project are provided in Appendix E. Impacts on public access are evaluated in accordance with Secretarial Order 3373, “Evaluating Public Access and BLM Public Land Disposals and Exchanges.”

Analysis Area

The area of analysis for recreation is the extent of land that could be directly affected by the Project and where access to recreational opportunities could be directly or indirectly affected.

Baseline Description

Public recreation lands managed by the BLM are designated as either a special recreation management area (SRMA) or extensive recreation management area (ERMA). SRMAs require more intensive recreation management or investment to accommodate intensive recreation management and where recreation is a principal management objective. ERMAs constitute all public lands outside SRMAs and are areas where recreation is non-specialized, dispersed, and does not require intensive management. Recreation may not be the primary management objective in these areas, and recreational activities are subject to few restrictions. Recreation management areas, objectives, and actions in the Project area are identified in the 1998 Las Vegas RMP (BLM 1998).

The Project area is located almost entirely within the Southern Nevada ERMA, as shown in Figure 3.2-1. The distal portion of development area D (approximately 139 acres [56 hectares]) is in the Muddy Mountains SRMA. Three main categories of recreation are found on BLM-administered lands: dispersed recreation, developed recreation, and special recreation permitting. Only dispersed recreation is found in the Project area.

Public access is essential for recreation uses to function. Areas and routes are designated during the planning process in accordance with BLM regulations and include the following three management categories:

- Open: An area where all types of vehicle use are permitted at all times. This designation refers to cross-country travel both on and off roads.
- Limited: Areas where vehicle use is restricted at certain times, in certain areas, and/or to certain vehicular use to meet specific resource management objectives. These limitations may include the number or types of vehicles; the time or season of use; permitted, administrative, or licensed use only; use on existing roads and trails; and use only on designated roads and trails.
- Closed: Motorized vehicles are permanently or temporarily prohibited. The use of motorized vehicles in closed areas may be allowed for certain reasons; such use is only allowed with the approval of the BLM-authorized officer.

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3.2 Recreation

The most common recreational activities likely to occur in the Project area include OHV use and potentially camping, hiking, and shooting. All access routes in the Project area are designated as limited. OHV travel in the Project area is limited to existing roads, trails, and dry washes. Recreationalists may travel through the Project area on their way to sites in the Muddy Mountains. Popular attractions that draw recreationalists to the area include Valley of Fire State Park, one of Nevada's most visited parks; the Muddy Mountains, including Muddy Mountains Wilderness Area, Hidden Valley ACEC, Muddy Peak, Buffington Pockets, Colorock Quarry; BSBCB; the OSNHT; and Lake Mead National Recreation Area. Recreation attractions in the Project area are shown on Figures 3.1-3 and 3.2-2.

According to the BLM, there are no current active OHV race tracks or courses in the Project area (Leslie, Steve 2018); however, races were held in the Project area in 2010 and 2011, including The Mint 400, a popular truck and buggy race held in the Las Vegas area on a semi-annual basis (Leslie, Steve 2018, The Mint 400 2018). Maps found online for the 2010 course show the race started and finished just south of the Moapa Paiute Travel Plaza off Valley of Fire Road, and sections of the course were located along portions of Old Spanish Trail Road, BSBCB, Route 167, a transmission line road that runs on the east side of the Dry Lake Range, and SR 40 (parallel to I-15). Recent courses of The Mint 400 race have been located southwest of Las Vegas in Jean, roughly 60 miles (97 kilometers) from the Project area (The Mint 400 2018). The nearest active race tracks identified by the BLM are motorcycle race routes located northeast of the Project area, the closest of which is approximately 1,600 feet (489 meters) east of the edge of the Project area (Figure 3.2-2) (Leslie, Steve 2018). Traffic counts provided by the BLM for BSBCB recorded an average of 9 trips per day and a projected annual total of 3,268 trips (Leslie, Steve 2018). Observed traffic levels on Valley of Fire Road are substantially greater than on BSBCB because the road is paved and serves as the primary accessway to Valley of Fire State Park.

3.2.2 Environmental Consequences

Introduction

The Project would have direct effects on existing recreational opportunities within the solar development areas for the duration of facility operation, until the completion of decommissioning. The Project would result in the loss of public land used for dispersed recreational activities. Several existing roads and tracks used for OHV activities, camping, hiking, and biking would be closed or removed. Direct access would be eliminated to Valley of Fire Road, I-15, and BSBCB using more established routes such as Old Spanish Trail Road in development areas D and E; Route 167 in development area D; and SR 40 in development areas A and B (refer to Figure 3.2-2). Direct effects from construction, operation, and decommissioning would have similar impacts on recreation and are addressed together.

Proposed Action

Direct Effects

Dispersed Recreational Use (Non-OHV). Approximately 7,100 acres (2,873 hectares) of land that is currently open to recreational use, including hiking, camping, and shooting, would be removed from use for a period of approximately 30 years during Project operation and for the duration of restoration, which for the Proposed Action could be many decades longer due to the level of soil and vegetation disturbance from the Project. The loss would not be substantial, as many other similar areas are available for these activities in the vicinity and greater region. For example, the Southern Nevada ERMA is 2,518,035 acres (1,019,13 hectares) in size. The Project represents only 0.3 percent of the ERMA. Almost the entire Project area is within an ERMA (all but 139 acres [56 hectares] within development area D), as shown in Figure 3.2-1. The 139 acres (56 hectares) in the SRMA is at the edge of the SRMA, and loss of this area

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3.2 Recreation

would have minimal effects on Muddy Mountains recreational uses due to its distance from the core recreational area and the lack of trails. The Project, additionally, would only occupy approximately 16 percent of the 44,000-acre (17,806-hectare) ROW application area. The remaining 36,900 acres (14,932 hectares) in the ROW application area surrounding the solar facility would remain open to public recreational use.

Recreational Access (Non-OHV). People traveling across the site to Valley of Fire Road, BSBCB, or even back to I-15 may also enjoy dispersed recreation in the Project area. Recreationalists may travel along Old Spanish Trail Road in development areas D and E, or Route 167 in development area D (refer to Figure 3.2-2), likely turning on Valley of Fire Road to head to I-15 or towards BSBCB or the Muddy Mountains and Valley of Fire State Park. Alternatively, recreationalists come from Valley of Fire Road or BSBCB and turn on Old Spanish Trail Road or Route 167 to head south. The Project would sever direct access along Old Spanish Trail Road through development areas D and E, cutting off access between Old Spanish Trail Road and Valley of Fire Road. The Project would also cut off access on Route 167 through development area D, where it connects to the BSBCB and Valley of Fire Road. Route 40 connects Valley of Fire Road to a frontage road along I-15 through development areas A and B. This road would be removed but is not a major recreational access route. MM Recreation (REC)-1 would minimize adverse effects on recreational access along Old Spanish Trail Road and Route 167 within the Project area by rerouting both roads, through signage, to either the California Wash or the Arrowhead Trail. Alternate connections to Valley of Fire Road, I-15, and BSBCB would be provided. The detoured routes would be longer but would still provide for recreational access and would not sever access to the BSBCB, the Muddy Mountains, Valley of Fire State Park, or I-15.

OHV Use and Access. The development of the solar facility would result in the closure of several currently accessible OHV single- and two-track trails, totaling 39 miles (63 kilometers) (refer to Figure 3.2-2) (Leslie 2019). The Project would not affect OHV routes approved for speed competitions that are in the ROW application area but are not in the area of proposed solar development. While other OHV tracks are available in the ROW application area and in the greater Clark County area, OHV access is considered a diminishing resource.

Access would be severed across single- and two-track areas that connect from the west side of the Project site near I-15 to the east side. Established roads that may be used in the future for races like The Mint 400 would also be removed, including 3.6 miles (5.8 kilometers) of Old Spanish Trail Road and 0.6 mile (1 kilometer) of Route 167. Removal of these roads would impede the OHV recreational opportunities and uses in the areas surrounding the solar facility. The Project would result in the closure of 46 miles (74 kilometers) of roads and OHV trails, causing adverse effects. Exiting OHV single- and two-track trails could provide additional access connections for OHV around the Project development areas. MM REC-1 would also minimize adverse effects on OHV access along Old Spanish Trail Road and Route 167 within the Project site.

Indirect Effects

During construction, substantial traffic increases on Valley of Fire Road could temporarily affect public access to recreational opportunities in the Project area by causing traffic delays. Traffic and transportation impacts are addressed in detail in the *Transportation and Traffic Technical Report* (EPD Solutions, Inc. 2019) and Section 3.16: Transportation. The increase in vehicle traffic during construction and decommissioning is not expected to create unacceptable delays on Valley of Fire Road from I-15 to the Project site entrance. Once the Project is operational, traffic impacts would be minimal. Decommissioning impacts would be similar to construction impacts.

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3.2 Recreation

Dispersed recreationalists in the Project area may be sensitive to visual changes in the landscape during all phases of the Project. The Project would involve developing a substantial portion of the natural desert landscape with solar panels and other facilities. Developing areas visible from recreational features and roads in the Project area could degrade views that contribute to the recreational appeal of the area, which would be an adverse effect, both during construction and once the Project is operational. Visual resource impacts are addressed in detail in the *Visual Resources Technical Report* (Panorama Environmental, Inc. 2019i) and Section 3.10: Visual Resources. MMs VR-1, VR-2, and VR-4 would reduce adverse effects through color treatment of Project structures and use of anti-reflective coating on solar panels. Some degree of indirect, adverse impacts on recreation from visual changes would occur.

Residual Effects

Residual effects related to the loss of OHV uses within the solar array would remain. Residual indirect but adverse effects from the visibility of the Project from recreational areas and designated routes (such as the BSBCB and the OSNHT) would also remain.

Cumulative Effects

Most of the cumulative projects are located within Clark County. Cumulatively, the projects would result in the loss of 30,052 acres (12,162 hectares) of recreational land. Other projects on BLM-administered lands (such as #15, Yellow Pine Solar Project and #29, Ivanpah Airport Project) could also result in the loss of OHV lands. The cumulative loss of OHV lands to solar development would be considered substantial and adverse.

All Mowing Alternative

The All Mowing Alternative would have similar impacts as the Proposed Action. This alternative would include more development closer to I-15 in development areas G, B1, and B2, but would avoid the southern portions of development area D. The All Mowing Alternative would result in the closure of 52.4 miles (84.3 kilometers) of roads and OHV trails. This alternative would eliminate any development in the SRMA and would not sever access along Route 167. All other direct and indirect impacts would be similar, including access along Old Spanish Trail Road. The same mitigation would apply to this alternative.

Residual impacts on OHV uses would be similar to those described for the Proposed Action and would be adverse.

Cumulative effects would be similar to those described for the Proposed Action. The cumulative loss of OHV lands would be considered substantial and adverse for the 30-year duration of the solar facility's operation. Restoration of the site after decommissioning for the All Mowing Alternative would be much faster than for the Proposed Action. Recreational use is expected to resume on the restored landscape, potentially within a few years. The All Mowing Alternative includes the maintenance of the soils, native vegetation, hydrology, and topography during the construction and operation of the site. Disturbance would be approximately 3 percent of the overall development acreage as compared with 100 percent under the Proposed Action. Once the facility is removed in 30 years, the setting and recreational use opportunities, including OHV use, would be returned to pre-Project conditions within a few years.

Hybrid Alternative

The Hybrid Alternative would have similar impacts as the Proposed Action. The Hybrid Alternative would result in the closure of 46.4 miles (74.7 kilometers) of roads and OHV trails for the 30-year duration of the solar facility operations. The same mitigation would apply to this alternative and the

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3.2 Recreation

Proposed Action. Decommissioning would have similar impacts to those under the Proposed Action for the 35 percent of the facility constructed using disk and roll methods. Restoration would take decades; therefore, under the Hybrid Alternative, approximately 2,578 acres (1,043 hectares) of recreational lands would remain impacted and removed from recreational use. The mowed acreage, 4,460 acres (1,805 hectares), would require much less restoration and would be returned to recreational and OHV use within a few years of facility decommissioning.

Residual impacts on OHV uses would be similar to those described for the Proposed Action and would be adverse.

Cumulative effects would be the same as described for the Proposed Action. The cumulative loss of OHV lands would be considered substantial and adverse.

No Action Alternative

Under the No Action Alternative, the Project would not be developed and the existing environmental setting would be maintained. The Project site would not be expected to change noticeably from existing conditions and would not result in the impacts on recreation described for the Proposed Action or other alternatives.

Mitigation Measures

- MM REC-1: Old Spanish Trail Road and Route 167 Reroute (from Section 3.2: Recreation)
- MM VR-1: Visual Design Elements (from Section 3.10: Visual Resources)
- MM VR-2: Surface Treatment (from Section 3.10: Visual Resources)
- MM VR-4: Anti-reflective Coating (from Section 3.10: Visual Resources)

3.3 Geology, Soils, and Mineral Resources

3.3.1 Affected Environment

Introduction

This section is based on information provided in the June 2018 *Preliminary Geotechnical Investigation* (Ninyo and Moore 2018) as well as minerals reports (EnviroMINE 2018); additional details are available in these studies and reports. Regulations and laws that apply to the Project are provided in Appendix E.

Analysis Area

The analysis area for geology, soils, and minerals is limited to areas within 0.5 mile (0.8 kilometer) of the Project site, referred to as the Project area. This geographic extent is appropriate because effects of the Project's construction and operation on mineral availability, slope stability, and geologic hazards generally do not extend far beyond the Project site. Erosion could impact areas downstream of the Project site, potentially for a few miles.

Baseline Description

Topography

The Project area is located in the Dry Lake Valley/California Wash Basin in the northeastern portion of the Mojave Desert. The Project area is bound by the Dry Lake Range directly to the west and the Muddy Mountains to the east. The Arrow Canyon Range and Las Vegas Range are further to the west. Dry Lake

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3.3 Geology, Soils, and Mineral Resources

Valley drains generally toward the north and into the Muddy River, which is approximately 13 miles (21 kilometers) north of the Project site. The Muddy River drains from mountain ranges to the northwest of the Project site to meet with the Virgin River in Lake Mead. The terrain of the Project area is relatively flat (see Figure 3.3-1 for a map of the Project area terrain and elevation), with elevation changes of less than 5 percent across the Project site.

Climate

The climate in the region is semi-arid and typical of a desert in southern Nevada, with close to 300 days of sunshine per year. Average annual rainfall in the local area is approximately 4.3 inches (10.9 centimeters) (WRCC 2016a).

Geology

The Project site lies within the Northern Basin and Range Province of the southwestern United States with topography that is characterized by linear, north and south trending valleys and normal faultblock mountain ranges resulting from extension of the Earth's crust. The Project area is located between several thrust faults, where older rocks are thrust above younger rocks. The Muddy Mountains thrust and Arrowhead thrust are located to the east, and the Dry Lake thrust is to the west (Beard, et al. 2010). Geologic units are shown on Figure 3.3-2. Further geologic setting information is provided in Sections 4, 5, and 6 of the *Preliminary Geotechnical Investigation* (Ninyo and Moore 2018).

Soils

Soil series within the Project area are predominantly Bard and Arada fine sand (refer to Figure 3.3-3). The surface soils generally have a low erodibility from water, but high wind erosion in some areas (refer to Table 3, Major Surface Soil Units in the Project Area, in the *Preliminary Geotechnical Investigation*). The surface and subsurface soils are corrosive to steel and other metals (NRCS 2017, USDA 1980). Recent soil chemistry testing indicates that soils on the Project site have a pH of approximately 8.5 and that sulfide, chloride, and sodium sulfate are generally below detection levels (Ninyo and Moore 2019). The subsurface soils on the Project site have a low collapse potential; that is, they hold their volume stable when wet. Significant layers of moderately hard to very hard, strongly cemented soil (caliche) with rock-like characteristics were encountered in subsurface soils on the Project site. Numerous, relatively thin layers of caliche were interbedded in the native soil layers, and several layers of slightly cemented native soil were encountered during the preliminary geotechnical investigation for the Project (Ninyo and Moore 2018).

Geologic Hazards

Fault Rupture and Seismic Shaking. The Project site is within the Southern Nevada Seismic Belt, a south-southwest trending zone of seismic activity characterized mainly by background earthquakes (i.e., earthquakes not associated with surface expression), between the Las Vegas Shear Zone and the Pahranaagat Shear Zone. Several active⁵ and potentially active⁶ faults are located in the region (refer to Figure 3.3-4). The California Wash fault is the closest active fault, located 2 miles (3.2 kilometers) east of the Project site (Ninyo and Moore 2018). The Project area could experience moderately perceived shaking and very light damage to structures during an earthquake (Freeman, Irfanoglu and Paret 2004).

⁵ Active faults are those that have resulted in surface rupture in the past 11,000 years (Holocene period, 11,700 years BP to present).

⁶ A fault is considered potentially active if there is evidence of fault displacement during the Quaternary period (approximately the past 1.6 million years).

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3.3 Geology, Soils, and Mineral Resources

Liquefaction. The potential for liquefaction increases with shallower groundwater. Groundwater in the Las Vegas area ranged from approximately 60 to 75 feet (18 to 23 meters) below ground surface between 2007 and 2017 and was not encountered during exploratory borings (USGS 2018). The potential for liquefaction in sediments within and around the Project area is likely to be low (Ninyo and Moore 2018).

Landslide and Rock Fall. A landslide is a downward and outward movement of slope-forming materials composed of rock, soils, or artificial fills, or a combination of these. The incidence of rock falls and slope failures can be moderate to high along mountain fronts. The risk of rock falls and slope failures decreases toward the flat valley center. The potential for landslides is low in the Project area due to its distance from the mountains and flat topography (Ninyo and Moore 2018).

Subsidence. Groundwater pumping can cause subsidence or sinking of land, potentially resulting in differential compaction, reactivation of old faults, and surface fissuring. No land subsidence monitoring has taken place in Dry Lake Valley, but subsidence has been monitored and found to occur in the adjacent Las Vegas Valley subbasin (USGS 1999). Although groundwater pumping has occurred in the Project area, no ground fissures were observed or recorded in the Project area (Ninyo and Moore 2018).

Expansive Soils. Expansive soils generally contain fine-grained clays that can absorb greater amounts of water than other soils, which swell and expand the soils' volume during the wet season. The repeated expansion and contraction of expansive soils can result in damage to structures, such as cracking. Moderately to highly expansive soils are located in the Project area (Ninyo and Moore 2018).

Minerals

A variety of minerals are mined in Clark County: predominately building materials such as saleable mineral materials (e.g., sand, gravel, boulders), limestone, and gypsum, but also gold and silver (Clark County 2017). Although gypsum is found in Clark County, geologic data indicate a very limited presence of gypsum in the Project area. The Pacific Coast Building Products (commonly known as PABCO) Apex Quarry, a gypsum quarry, is located approximately 13 miles (21 kilometers) south of the Project area. Saleable mineral materials constitute the majority of the mineral estate within the ROW Application Area. No active mining claims, oil and gas leases, or mines are located within the ROW Application Area, and the area was closed as an exploratory unit in the 1980s (EnviroMINE 2018). There are several abandoned and inactive historical oil and gas wells on the Project site (HERServices 2018). The Project site has a low geothermal energy potential, and there are no active geothermal sites or known geothermal resource areas (Geo Energy 2016, Nevada Bureau of Mines and Geology 2018). The ROW Application Area is currently withdrawn from mineral entry under mining law (i.e., mining claims cannot be staked) for a period of 2 years from the date of release of the NOI.

3.3.2 Environmental Consequences

Proposed Action

Construction

Geology and Soils. Surface rupture from faulting would not occur on the Project site as there are no active faults on the site. The potential for construction crews to experience effects from seismic ground shaking would be minimal. In the unlikely event of an earthquake, construction workers could be exposed to hazards from seismic ground shaking or ground failure. Construction of the Project would not substantially increase the risks of seismic hazard exposure over typical seismic hazard risks throughout the region. Earthquake safety training pursuant to Occupational Safety and Health Administration

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3.3 Geology, Soils, and Mineral Resources

(OSHA) regulations would minimize the potential for effects on workers. The Project site is flat and generally stable. An earthquake would not cause landslides or other ground destabilization that could harm life or property.

The potential for soil collapse in the Project area is low. Slope destabilization and liquefaction potential is also low. Construction activities, including grading, disk and roll, and trenching, would not cause or increase the risk of landslides, liquefaction, or soil collapse. Subsidence potential is low (Ninyo and Moore 2018). No indirect or direct effects resulting in destabilization of unstable soils or geologic units would occur during construction.

Construction of the Proposed Action would occur in phases. By the end of construction, approximately 7,071 acres (2,862 hectares) would be developed, and vegetation would be removed from the Project site to install access roads and firebreaks, solar arrays and associated equipment, battery storage, a potential well or a pipeline from the Moapa Paiute Travel Plaza, an O&M building, and substations. Soils in the Project area have the potential to erode from both wind and heavy rainfall. Surface disturbances and the removal of vegetation during construction would increase the potential for soil erosion. In accordance with the Construction Stormwater General Permit NVR100000, a SWPPP would be prepared and implemented during construction, which would include installation of site-specific erosion control BMPs (as identified in the SWPPP). The Project BMPs identified in the POD, including installation and routine maintenance of sediment controls, would be implemented throughout construction. Direct adverse effects from soil erosion caused by construction would be minimized. Traditional construction methods would include some grading of surface soils, which could result in the loss of topsoil. Project BMPs from the POD include salvaging of topsoil to minimize adverse effects from its loss.

Mineral Resources. No active mining claims, oil and gas leases, or mines are present on the Project site. No geothermal leases or operations are located on or near the site. Continued operation of existing mines outside of the Project site would not be hindered by construction activities. The Project would involve the temporary withdrawal of approximately 7,100 acres (2,873 hectares) of land from mineral entry under mining law (i.e., mining claims cannot be staked) for a 2-year period following release of the NOI. During construction, any saleable mineral materials would likely be balanced on the Project site (i.e., any saleable minerals extracted from within the ROW would be used within the ROW for construction). If any excess saleable mineral materials were generated during construction, the materials would be disposed of and exported from the Project site through a BLM Contract for the Sale of Mineral Materials or Free Use Permit or stockpiled within the ROW or another mineral mining site for future disposal by the BLM. The Applicant would provide an estimate of the amount of mineral material to be exported based on grading plans, if material is to be removed from the site. The quantity of excess saleable mineral materials and soil resources that could be removed from the Project site during construction would not be substantial compared to the overall quantity that would remain and be available following decommissioning. No substantial adverse direct effects on the availability of mineral resources or mineral extraction would occur.

Operation and Maintenance

Geology and Soils. Workers on the Project site conducting maintenance or general operational activities could be exposed to seismic shaking, if an earthquake were to occur. Earthquake safety training pursuant to OSHA regulations would minimize the potential for effects on workers. Seismic hazards would not result in a substantial direct effect on the Proposed Action or workers during O&M.

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3.3 Geology, Soils, and Mineral Resources

Geologic units on the Project site are stable (refer to Figure 3.3-2). O&M activities would not cause or increase the risk of landslides, liquefaction, or soil collapse. No direct effects resulting in destabilization of unstable geologic units would occur during O&M.

Due to the presence of moderately to highly expansive and clayey soils, foundations and access roads could crack and shift. Equipment could be damaged, and vehicles traversing the Project site could experience challenging terrain. Substantial direct effects caused by unstable soils could occur during O&M. A design-level geotechnical evaluation and implementation of recommendations to manage expansive soils, corrosive soils, and cemented soils would be conducted prior to construction, with recommendations incorporated into the Project's final design. Direct effects caused by unstable soils during O&M would be minimized by implementing the recommendations of the design-level geotechnical evaluation.

O&M activities would not involve new, substantial ground-disturbance. Some weeds could grow on the Project site, necessitating removal. Native vegetation, however, would not be expected to regrow on the Project site beneath the panels in most areas. The Project site is subject to flash floods under existing conditions. Impervious surfaces would increase by approximately 35 acres (14 hectares) and unpaved, unvegetated areas would increase by approximately 7,062 acres (2,858 hectares) once the Project were fully built out. These changes in site conditions would result in increased stormwater runoff via overland flow, which could redirect surface flows, resulting in increased erosion in both on-site and off-site washes. Soils in the Project area generally have low water erosion potential, but the removal of vegetation and volume of flow could still result in erosion. The areas of greatest erosional concern would be over development area B, where eroded soil would flow into the wash to the east. The structural integrity of the solar panels could be impacted by soil erosion if erosion were to create significant gullies and rills in the solar array areas. MM Geology and Soils (GS)-1 would require periodic repair of deep rills and erosion scars in the solar array areas, as well as installation of erosion stabilization (such as riprap) in areas where increased flows could heavily erode the banks of washes, and to keep flows channelized. The appropriate permits from the USACE would be obtained for any stabilization to be installed in jurisdictional waters (refer to Section 3.6: Vegetation and Jurisdictional Waters). Erosional impacts on Project components and land stability would be minimized through mitigation.

Increased erosion on the Project site from stormwater overland flows could result in increased deposition of fine-grained sediments into the surrounding washes, which would likely flow downstream and off site before settling out of the washes. Because no uses such as agriculture or built structures are located downstream for up to 13 miles (21 kilometers), periodic increases in fine-grained sediment loads and deposition are not expected to have adverse effects. Deposition of fine sand could have beneficial effects on sensitive plant species, such as threecorner milkvetch. The washes in the region generally move large quantities of all sizes of sediment as part of the natural desert processes, changing course and depositing soils during large storm events. Adverse effects from increases in transport of fine-grained sediment are not expected. Note that Section 3.5: Water Resources addresses changes in the volumes of water runoff (including over Valley of Fire Road), which would also increase given the large increase in land cleared of vegetation.

Wind-driven erosion would occur across the bare soils in all solar development areas where soils are exposed. MM Air Quality (AQ)-1, from Section 3.9: Air Quality and Climate Change, would require soil stabilization measures to minimize air quality impacts from windblown dust. Transport of windblown sediments would be adverse where it impacts air quality.

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3.3 Geology, Soils, and Mineral Resources

Mineral Resources. O&M activities on the Project site would not adversely affect the operation of existing mines outside of the Project site. Surface extraction of mineral resources would not be possible for the period of operation of the solar facility; however, only saleable mineral materials are known to be present in quantities with high enough potential for mining and these materials are readily available in the surrounding BLM-managed lands. Impacts on mineral resources are expected to be low and would not be adverse.

Decommissioning

Geology and Soils. Decommissioning activities would be similar to construction activities. Reclamation and decommissioning activities would be confined to previously disturbed areas to the extent practicable. Impervious surfaces would be ripped and scarified, and generally seeded in the fall without mulch. Some erosion could occur if recontoured land were to result in new drainage patterns. Substantial direct effects could occur if vegetation did not successfully grow back following decommissioning. A Decommissioning Plan would be prepared that requires restoration of native plant communities to minimize erosion and minimize prolonged exposure of bare soils. Natural revegetation is slow, but restoration techniques have been observed to initiate ecosystem recovery and accomplish project objectives in Mojave Desert study areas (Abella and Newton 2009). A Site Restoration Plan would be prepared that addresses revegetation success during decommissioning in order to minimize effects.

Mineral Resources. Decommissioning activities would not adversely affect development of geothermal resources or operation of existing mines outside of the Project site. Impacts on mineral resources would be similar to those discussed under the heading "Construction and Operation/Maintenance." Once decommissioning is completed and the ROW terminated, the surface would be available for surface extraction of mineral resources again. No direct effects on the availability of mineral resources or mineral extraction would occur during decommissioning.

Residual Effects

Implementation of a SWPPP, BMPs, and MM GS-1 would reduce potential adverse effects from soil erosion caused by construction, O&M, and decommissioning. Similar mitigation measures have been implemented and proven to be effective in reducing erosion caused by surface-disturbing projects on BLM-administered land throughout the western United States. Implementation of the mitigation measure would not be expected to result in any other effects, provided that appropriate permits were obtained. Residual erosion effects would be limited to some increases in downstream transport of fine sediment. No residual effects would be expected on mineral resources, as the lands would be available for surface extraction upon completion of decommissioning activities and termination of the ROW.

Cumulative Effects

Erosion. Construction involving ground disturbance and vegetation removal have occurred and would occur in the Project area as a result of the cumulative projects that are located within the same watershed, such as #21, TransWest Express Transmission Project. Impacts from cumulative projects could combine to result in substantial adverse effects resulting in soil erosion and loss of topsoil. Exposure of bare soil would increase erosion and sedimentation from wind and water. All cumulative construction projects that disturb more than 1 acre (0.4 hectare) of land would be required to comply with the Construction Stormwater General Permit, requiring preparation and implementation of an SWPPP. Erosion control BMPs in the SWPPP would minimize erosion. The cumulative impacts related to erosion would not be substantial.

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3.3 Geology, Soils, and Mineral Resources

Mineral Resources. The cumulative effects on mineral resources would be moderate, as construction of cumulative projects that limit surface extraction and withdrawal of lands from mineral entry under the mining law would accumulate. However, in the long term, the cumulative effects would be temporary, as the lands would be opened to mineral entry and surface extraction could occur following decommissioning of the Project site and termination of the ROW. None of the adjacent cumulative projects are mining projects. Many of the cumulative solar projects would involve withdrawal of BLM-managed land from future mineral exploration and mining for a period of 20 to 30 years. The withdrawal would likely be renewed at the end of the 20 to 30 years for each of these projects. Following decommissioning and termination of the ROW, the cumulative project sites would be opened to mineral entry and surface extraction. The withdrawal of land would not pose a cumulatively significant effect on the availability of mineral resources, given the amount of additional lands available in the region.

All Mowing Alternative

The All Mowing Alternative would involve mowing of on-site vegetation under the solar arrays, reducing the overall disturbed soil by 97 percent, compared to the Proposed Action. Direct and indirect effects related to erosion could still occur from grading of approximately 200 acres (81 hectares) of soils for perimeter and access roads, substations, and equipment within the Project site. Mitigation would minimize any potential adverse effects caused by erosion.

Residual erosion effects from downstream transport of fine sediment from construction, O&M, and decommissioning of the All Mowing Alternative would be negligible. A design-level geotechnical evaluation and implementation of recommendations would still be required, which would minimize the effects of unstable soils. No residual impacts on mineral resources would occur.

Cumulative impacts would be similar to those described for the Proposed Action. This alternative would reduce ground disturbance and exposure to erosion, further reducing cumulative impacts as compared to the Proposed Action.

Hybrid Alternative

The Hybrid Alternative would involve mowing approximately 65 percent of the solar field instead of disking, thereby reducing the overall acreage of bare soil compared to the Proposed Action. Development using traditional methods and grading would disturb 2,578 acres of soils (1,043 hectares) on the Project site. Mowing would result in more stable soil and would minimize the potential for wind- and water-driven erosion compared to the Proposed Action. Direct and indirect adverse effects from erosion could still occur. Implementation of mitigation measures would minimize potential adverse effects caused by erosion.

Residual erosion effects from construction, O&M, and decommissioning of this alternative would be limited to some increases in downstream transport of fine sediment. A design-level geotechnical evaluation and implementation of recommendations would also be required for any alternative implemented, which would minimize the effects of unstable soils. No residual impacts on mineral resources would occur.

This alternative would reduce ground disturbance and exposure to erosion, further reducing cumulative impacts compared to the Proposed Action. Other cumulative impacts would be the same as for the Proposed Action.

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3.3 Geology, Soils, and Mineral Resources

No Action Alternative

The Project would not be built under the No Action Alternative. No effects would occur.

Mitigation Measures

- MM GS-1: Operation and Maintenance Erosion Control (from Section 3.3: Geology, Soils, and Mineral Resources)
- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

3.4 Paleontological Resources

3.4.1 Affected Environment

Introduction

Paleontological resources, or fossils, are the remains of extinct organisms and provide the only direct evidence of ancient life. The BLM defines “significant paleontological resources” as any fossil that is of scientific interest as well as certain rare or unusual invertebrate and plant fossils (BLM 2008a). A significant paleontological resource is of scientific interest if it is a rare or previously unknown species, is of high quality and well-preserved, preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has an identified educational or recreational value. This section is based on information provided in the *Paleontological Technical Study for the Gemini Solar Project* (Paleo Solutions, Inc. 2018). Regulations and laws that apply to the Project are presented in Appendix E.

To understand the potential for paleontological resources to be present on the Project site, published and available unpublished geological and paleontological literature, maps, museum records, online databases, and aerial photographs were reviewed. Field surveys were conducted from April 17 through 21, April 23 through 25, and June 18 through 20, 2018, to determine the paleontological potential of the geologic units underlying the Project area and to document previously unrecorded fossil localities. Results of the research were used to assign Potential Fossil Yield Classification (PFYC) rankings to the geologic units within the Project site and surrounding area in accordance with BLM protocol (BLM 2016b, BLM 2008a). Figure 3.4-1 shows the PFYC rankings for the Project site and surrounding areas. All geologic units have a ranking of U (Unknown), 2 (Low), or 3 (Moderate).

Analysis Area

The area of analysis for paleontological resources encompasses the development areas for the Project and alternatives and includes the area of disturbance for all Project components, including the solar facility and associated facilities, roads, collector lines, and gen-tie lines. No impacts beyond the disturbance areas would occur.

Baseline Description

Geologic and Paleontological Setting

The Project area is in southern Nevada within the Las Vegas Valley, in the Basin and Range Province. The Project area is characterized by geologic units from the late Miocene (11.8 million years ago [mya] to 5.3 mya), Pliocene (5.3 mya to 2.6 mya), Pleistocene (2.6 mya to 0.01 mya), and Holocene (0.01 mya to present). Most of the site contains younger Pleistocene- to Holocene-age alluvial deposits (Beard et al. 2007). The western portions of the Project site are underlain by older, upper Miocene to lower Pliocene

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3.4 Paleontological Resources

deposits. The eastern portions of the site generally include the younger, late Pliocene to Holocene deposits.

Miocene deposits rarely contain fossils in this region, but some camel, antelope, and other mammalian fossils have been found in similar deposits. Miocene deposits in the Project area generally have a PFYC of 3. Early Pliocene to late Pleistocene deposits in the Mojave Desert region have occasionally yielded well-preserved animal fossils, including fish, salamanders, frogs, toads, giant tortoise, snakes, birds, rodents, rabbits, camels, and cats (Paleo Solutions, Inc. 2018). These geologic units have a PFYC of either U or 3. Holocene deposits in the region generally do not yield fossils and have a PFYC ranking of 2.

Results of Survey

There are no previously recorded fossil localities within the Project site; however, four new fossil localities were recorded during the paleontological field survey. Three of the four fossil localities were non-significant fossil occurrences, and one was a significant fossil locality. The significant fossil locality recorded during the survey was an ex-situ (out of its original place) vertebrate bone, potentially a mammal ear bone, from an area of low topographic relief from intermediate-age sidestream alluvium. Although slightly weathered and recorded as ex-situ, the vertebrate remains were well-preserved, with small, identifiable structures. Significant fossils may be present within the Pleistocene-age or older geologic units throughout the Project site that were not detected during the survey (Paleo Solutions, Inc. 2018).

3.4.2 Environmental Consequences

Introduction

The Project would have adverse impacts if it resulted in the destruction of a scientifically significant paleontological resource by directly damaging the resource, such as by crushing it under equipment. Indirect effects could result from increased access to paleontological resources by construction personnel when the Project is being built. Indirect effects could occur during and after construction, which could bring more people (i.e., workers) into the area and, therefore, increase the likelihood of the loss of paleontological resources through vandalism and unauthorized collection. Actions that increase erosion can also cause indirect impacts on surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Proposed Action

Construction

The Project site is underlain by geologic units with a low, moderate, and unknown potential to contain paleontological resources (PFYC Class 2, 3, or U, respectively), as shown in Figure 3.4-1. Ground-disturbing activities could occur across approximately 5,960 acres (2,410 hectares) of moderately paleontologically sensitive older alluvium and could result in significant impacts on paleontological resources. Areas of the Project site underlain by geologic units with low potential to contain paleontological resources, which include Holocene-age young alluvium and artificial fill, still have some potential to contain paleontological resources. Holocene-age young alluvium (Qa) likely forms a thin veneer of surficial sediments within the washes across the site, and likely immediately overlies older deposits of moderate or unknown paleontological potential. Surface grading or shallow excavations entirely within Holocene-age young alluvium are unlikely to uncover significant fossil remains. Construction activities occurring entirely within previously disturbed sediments or recent artificial fill are

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3.4 Paleontological Resources

also unlikely to uncover significant fossil remains, and any recovered resources would lack stratigraphic context. Since young alluvium and artificial fill may shallowly overlies older in-situ sedimentary deposits, grading and other subsurface disturbance may result in adverse direct impacts on paleontological resources throughout the entire the Project site. MM Paleontological Resources (PR)-1 requires development and implementation of a Paleontological Resources Mitigation and Monitoring Program (PRMMP). The PRMMP must identify the requirements for construction employee training on paleontological resources, paleontological monitoring during ground-disturbing work, procedures to be implemented in the event of a discovery, and curation requirements for any scientifically significant fossils found. The measure would minimize the potential for adverse effects on previously undiscovered paleontological resources during construction of the Proposed Action. MM PR-2 requires collection of the one known fossil in order to avoid any potential damage to the fossil. With the implementation of mitigation, direct adverse impacts on paleontological resources under the Proposed Action would be reduced.

Indirect effects on paleontological resources from increased access by construction personnel could occur and would be minimized through implementation of MM PR-1, which includes requirements for paleontological resource worker awareness training and procedures for treating scientifically significant paleontological resources found on the Project site during construction.

Operation and Maintenance

Direct effects on scientifically significant paleontological resources would not occur. No new ground disturbance would occur during O&M. Indirect impacts on paleontological resources from theft or vandalism would not occur. The Proposed Action would not provide new public access to areas with the potential to contain paleontological resources. Any scientifically significant paleontological resources found on the Project site during construction would be collected and curated per the PRMMP prepared under MM PR-1. Fencing would limit public access onto the solar field. Use of the California Wash may increase due to mitigation to address recreational access, but such use is not expected to increase substantially. The likelihood of visitors finding paleontological resources in the California Wash is low.

The ground surface in the solar field would likely remain free of native vegetation over the life of the Project. The bare surface could increase surface erosion; however, any fossils within the first several inches of the surface would have likely been exposed during construction. If any fossils were found by workers during Project operations, the workers would be trained on procedures to ensure that the fossils are examined by a paleontologist and preserved, per MM PR-1. Substantial, indirect effects on paleontological resources would not occur.

Decommissioning

Decommissioning activities would be similar to construction activities. The Applicant would limit reclamation and decommissioning activities to previously disturbed areas and existing access roads to the extent practicable. Restoration would occur in accordance with the Site Restoration Plan, minimizing the potential for erosion. Direct and indirect impacts on scientifically significant paleontological resources would not occur, as all affected areas would have been previously disturbed. Reclamation would not increase erosion nor facilitate increased access (beyond pre-Project conditions) to areas that could contain paleontological resources. Adverse effects on paleontological resources would not occur during decommissioning.

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3.4 Paleontological Resources

Residual Effects

Implementation of the mitigation measures would reduce potential adverse effects on scientifically significant paleontological resources. Such mitigation measures have been proven effective in reducing adverse effects on fossils resulting from surface-disturbing projects on BLM-administered land throughout the western United States. However, even in the most effective PRMMP, inadvertent damage to paleontological resources can occur if the fossils are uncovered by excavation equipment and if fossils are not identified by paleontological monitors during excavation. Unless a fossil is destroyed, damage caused by construction equipment can typically be repaired in a paleontological laboratory. Implementation of the mitigation measures is not expected to result in any impacts.

Cumulative Effects

Cumulative projects are located on similar geologic units as the Proposed Action, some of which are designated as having a moderate potential for containing paleontological resources. Ground-disturbing construction activities could uncover and destroy significant paleontological resources, which would constitute a substantial, adverse cumulative impact on paleontological resources. The Proposed Action would involve ground-disturbing activities in areas where paleontological resources may be found. These resources could be destroyed during construction or illegally collected by the public, resulting in a substantial, adverse cumulative effect. The Project would contribute to the substantial cumulative effect due to the potential for loss of similarly aged, significant paleontological resources. MMs PR-1 and PR-2 require development and implementation of a PRMMP and collection of a known fossil site to avoid or minimize damage to paleontological resources. MM PR-1 requires paleontological resource worker awareness training and handling procedures, which would minimize the Proposed Action's contribution to the substantial cumulative effect on paleontological resources.

All Mowing Alternative

The All Mowing Alternative would involve mowing of the development areas across the Project site (versus clearing of all vegetation through disk and roll), reducing the potential for direct impacts on paleontological resources during Project construction. Previously undiscovered paleontological resources could still be damaged during trenching or excavation or even during mowing, resulting in direct impacts on the resources. Indirect impacts from erosion or worker collection of surfaced resources could also occur under the All Mowing Alternative. Since much of the ground surface under the solar arrays would be left undisturbed in the mowing areas, paleontological resources might not be discovered during construction and thus left on the surface to be discovered during O&M. Implementation of MMs PR-1 and PR-2 would minimize potential direct and indirect impacts on paleontological resources during construction and O&M.

Residual effects on paleontological resources would be less than the Proposed Action.

Cumulative impacts would be similar to those described for the Proposed Action and minimized through the mitigation.

Hybrid Alternative

The Hybrid Alternative would involve mowing approximately 65 percent of the solar field instead of disking, reducing the potential for direct impacts on paleontological resources during Project construction. Effects would be similar to those analyzed for the Proposed Action. The same mitigation measures would minimize potential direct and indirect impacts on paleontological resources during construction and O&M.

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3.4 Paleontological Resources

Residual effects on paleontological resources would be less than the Proposed Action.

Cumulative impacts would be similar to those described for the Proposed Action and minimized through the mitigation.

No Action Alternative

The Project would not be built under the No Action Alternative. No direct impacts on paleontological resources would occur. Access to the Project site by the public would remain the same and would pose the same level of risk for paleontological resources to be vandalized or stolen.

Mitigation Measures

- MM PR-1: Preparation and Implementation of a Paleontological Resources Monitoring and Mitigation Plan (from Section 3.4: Paleontological Resources)
- MM PR-2: Known Fossil Collection (from Section 3.4: Paleontological Resources)

3.5 Water Resources

3.5.1 Affected Environment

Introduction

Surface water resources include lakes and rivers, as well as floodplains, ephemeral streams (i.e., streams that carry water only briefly in direct response to precipitation), and wetlands. Some or all of these resources may contain or be considered waters of the United States, and thus subject to Section 404 of the Clean Water Act. The surface water information provided in this section is from the *Conceptual Drainage Report for the Gemini Solar Project* (Louis Berger 2019). A USACE jurisdictional delineation (Phoenix Biological Consulting 2018d) was conducted from September 5, 2017 to October 12, 2017 and from May 28 to May 31, 2018. The results of the aquatic resources delineation are presented in Section 3.6: Vegetation and Jurisdictional Waters.

Groundwater is water found underground in the cracks and spaces in soil, sand, and rock. It is stored in and moves slowly through geologic formations called aquifers. The groundwater information for the Project is provided in the *Preliminary Geologic and Groundwater Occurrence Evaluation* (Ninyo and Moore 2019) and the *Groundwater Modeling to Assess Water Resource Impacts for the Gemini Solar Project* (West Yost Associates 2019). Refer to these technical reports for additional information.

The Clean Water Act (33 USC §1251–1387) is the primary law protecting water quality in surface waters by means of methods to limit pollution discharges, both regulatory and nonregulatory. Additional protections to floodplains and wetlands are provided, respectively, by Executive Order 11988 (“Floodplain Management” [Federal Register, Volume 42, page 26, 951, May 24, 1977]) and Executive Order 11990 (“Protection of Wetlands” [Federal Register, Volume 42, page 26, 961, May 24, 1977]). Clark County participates in the National Flood Insurance Program created through the National Flood Insurance Act of 1968, and thus must approve a drainage study for construction of any new facility covering more than 2 acres (0.4 hectare) within the county.

All waters in Nevada are the property of the public in the state and are subject to the laws described in Nevada Revised Statutes (NRS), Chapters 532 through 538. The Nevada Division of Water Resources (NDWR), led by the State Engineer, is the agency responsible for managing groundwater resources. This

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3.5 Water Resources

responsibility includes overseeing water right applications, appropriations, and interbasin transfers (NDWR 2010). In accordance with NRS § 533.372, the State Engineer may approve or disapprove any application of water to a use involving generation of energy for export out of Nevada. Additional regulations and laws pertaining to water resources are described in Appendix E and in the *Information Summary of Water Rights, Supply, and Use for the Gemini Solar Project* (Panorama Environmental, Inc. 2019d).

Surface Water

Analysis Area

The area of analysis for surface waters includes (1) the mountain area drainage basins from which flows over the Project site originate (covering 128 square miles [331.5 square kilometers]); (2) the Project development areas; and (3) areas to the north of the Project area within the California Wash where any increased flows or sediment would be transported.

Baseline Description

The Project site is largely undeveloped desert land situated on a series of alluvial fans located at the base of the Muddy Mountains. The mountains and alluvial fans form the headwaters of the California Wash, which traverses through the middle of the Project site and ultimately drains to the Muddy River approximately 13 miles (21 kilometers) downstream to the north. Tributaries to the California Wash found within the Project area have been identified in this analysis as the West Tributary, East Tributary, and East Washes 1 through 3, as shown in Figure 3.5-1. The Project is in the Piute Point and Dry Lake quadrangles of the United States Geographical Survey (USGS) 7.5-minute topographic map series. Elevations in the Project area range from approximately 2,000 to 2,500 feet (610 to 762 meters) with the highest elevations in the southeast corner and the lowest in the northeast corner. No perennial waterbodies are found in the Project area. The California Wash comprises part of an approximately 50-mile-long (80-kilometer-long) stretch of desert between the Muddy River to the north and the Las Vegas Wash to the south.

In storm events, flows from the large upstream drainage area coalesce in the California Wash at the Muddy River. The largest historical peak flow recorded was approximately 30,600 cubic feet per second (cfs) (866 cubic meter per second [cms]), in the California Wash near the Moapa River Indian Reservation, on August 10, 1981 (USGS 2000). Other large flood events occurred in 2005 and 2014. The California Wash and its tributaries on the Project site have been designated by the Federal Emergency Management Agency (FEMA) as Zone A on the Flood Insurance Rate Maps. Zone A is a Special Flood Hazard Area (SFHA) subject to inundation by the 1 percent annual chance flood (i.e., 100-year flood event). Areas outside of the California Wash and its tributaries' SFHA are designated as Zone X, which are areas determined to be outside of the 0.2 percent annual chance (i.e., 500-year) floodplain.

Stormwater flows over the Project site eventually reach the Muddy River, 13 miles (21 kilometers) downstream. No perennial waterbodies are within the solar site or along the gen-tie lines or water pipeline route. Consequently, no surface water quality data are available for the Project site or area. Ephemeral drainages leaving the Project area are tributaries to the Muddy River, which is a perennial water as previously mentioned. The Muddy River is fed by springs connected to the regional groundwater system. The Muddy River is considered impaired and is on Nevada's 303(d) list for exceeding state water quality standards (NDEP 2014). For the Muddy River, NDEP developed site-specific numeric standards for pH, dissolved oxygen, maximum temperature, phosphorous, nitrite, nitrate, turbidity, total dissolved solids,

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color, and *Escherichia coli* (E. coli) to protect the designated beneficial uses and to maintain existing water quality.

Groundwater

Analysis Area

The area of analysis for groundwater resources is the Project site and an area up to 2 miles (3.2 kilometers) away from the Project site where effects of groundwater withdrawal could be measured. The discussion of water rights encompasses the groundwater basin in which the Project site lies, as well as the greater flow system associated with the Project's groundwater basin – a larger regional unit of six surrounding basins known as the Lower White River Flow System (LWRFS). Groundwater extraction is proposed as a potential option to meet the Project's water needs during construction and operation. Groundwater is also discussed in terms of the Project's potential to impact groundwater recharge or quality.

Baseline Description

Groundwater in Nevada is an important water supply source, providing approximately 40 percent of the total water supply used in the state. Thick sequences of carbonate rock underlie the alluvial basins in the Project area, forming part of a complex regional aquifer system (the Central Carbonate Rock Province) that is not yet fully understood.

The Project site falls within the California Wash Hydrologic Area (Basin 218 or California Wash Basin). The depth to groundwater in the California Wash Basin is believed to be highly variable, ranging from less than 50 feet (15 meters) below grade in the vicinity of the Muddy River in the northern portion of the basin, to greater than 300 feet (91.5 meters) below grade in the southern portion of the basin near the Project area (Ninyo and Moore 2019), to as much as 900 feet (274 meters) in areas such as Buffington Pockets (east of the Project site at the edge of the Muddy mountains). Groundwater in the California Wash Basin primarily originates from the underlying carbonate rocks and flows south from Coyote Spring Valley via Arrow Canyon to the north (LVVWD 2001). The California Wash Basin as well as the Muddy River and its headwaters fall within the LWRFS. The California Wash Basin and the LWRFS are shown in Figure 3.5-2.

Basin 218 has a Perennial Yield⁷ of 2,200 acre-feet (249 hectare-meters) of water per annum, according to the Hydrographic Area Summary Report 196 prepared annually by NDWR (NDWR 2018). The types of use in the basin are Industrial (6,905 acre-feet [851.7 hectare-meters]), Municipal (2,525 acre-feet [31.5 hectare-meters]), Irrigation (91 acre-feet [11.2 hectare-meters]), and Environmental (90 acre-feet [11.1 hectare-meters]); these uses combined, account for approximately 9,611 acre-feet (1,185.5 hectare-meters), a volume more than four times the Perennial Yield. Actual pumping in the California Wash Basin in 2016 was 252 acre-feet (31.1 hectare-meters) and in 2017 was 88 acre-feet (10.9 hectare-meters). The vast majority of the existing appropriations in the basin are not currently being used (Cooper 2017, Cooper 2018).

On January 11, 2019, NDWR introduced Interim Order #1303, designating the administration of all water rights within the LWRFS, including the California Wash Basin, as a joint administrative unit. This designation was established to give NDWR more flexibility regarding future aquifer development, as the LWRFS is severely over appropriated. Based on an aquifer test conducted by the State Engineer's Office

⁷ Perennial yield is the amount of usable water from a groundwater aquifer that can be economically withdrawn and consumed each year for an indefinite period of time without depleting the source.

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in 2011 and 2012, groundwater pumping in the LWRFS at a rate of approximately 14,500 acre-feet (17,788.6 hectare-meters) per year resulted in reduced flows to the springs that feed the Muddy River. This pumping rate is less than half of the approximately 38,000 acre-feet (4,687 hectare-meters) of appropriations in the flow system. Pumping rates in the LWRFS were greatly reduced after the Reid Gardner Generating Station closure in 2015. Pumping rates ranged from 9,090 to 9,637 acre-feet (1,121 to 1,189 hectare-meters) annually from 2015 to 2017. These pumping rates appear to be sustainable (State Engineer 2019). Annual pumping rates may have dropped further in 2018, due to the completion of the Playa Solar and Faraday Future Projects that had temporarily used groundwater for construction.

The Interim Order essentially establishes a moratorium on all future development within the LWRFS until NDWR and/or the active water services in the system can “prove scientifically” that development can be accomplished in a sustainable manner. New water appropriations would be difficult to obtain for the Project because it is in what is known as a “closed basin” (over-appropriated). However, users with existing appropriations may be able to sell water to the Project owner.

Access to purchased water could be provided by trucking water from an existing source; a new pipeline, if the water is purchased from the Moapa Band of Paiutes; or a new groundwater well on the Project site. If purchased from the tribe or from an existing appropriation and accessed through an on-site well, the current water appropriation holder would be required to apply for a temporary (in the case of construction water) or permanent (in the case of operational water) Change in Use, Manner of Use, and Point of Diversion with the State Engineer. The moratorium only applies to permanent Change in Use applications. Temporary Change in Use can proceed under NRS § 533.345 until the order is finalized in late 2019. In accordance with NRS § 533.372, the State Engineer may approve or disapprove any application of water to a use involving generation of energy for export out of Nevada, as previously stated.

3.5.2 Environmental Consequences

Introduction

Impacts to surface water quality downstream of the Project site could occur from sedimentation during construction and O&M of the Project. Impacts related to flooding from the alteration of surface water flows on the Project site could also occur during both Project construction and O&M. To evaluate the effects of a 100-year flood event during O&M, two different modeling software programs were used for the mountain and alluvial fan areas. The models were prepared in accordance with the Clark County Regional Drainage District Hydrologic Criteria and Drainage Design Manual. The results of the modeling for existing conditions and the Proposed Action and alternatives are shown in Figures 3.5-3 through 3.5-5. Infrastructure recommended in the drainage study was incorporated into the Project’s preliminary design. Refer to the *Conceptual Drainage Report for the Gemini Solar Project* (Louis Berger 2019) for more information.

Groundwater impacts could occur if on-site groundwater pumping were utilized to supply construction and operational water needs. The potential impacts of localized groundwater drawdown over the 30-year period of the Project were assessed using an existing one-dimensional numerical model of the region. Analytical modeling of groundwater drawdown was also performed for this Project using the USGS analytical model Water Table AQuifer (WTAQ) to provide additional spatial and temporal resolution of the potential impacts on groundwater levels due to Project groundwater pumping (Barlow and Moench 1999). Detailed methods and results are presented in the *Groundwater Modeling to Assess Water Resource Impacts for the Gemini Solar Project* (West Yost Associates 2019).

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Proposed Action

Surface Waters

Construction. Surface hydrologic features in the Project area include intermittent and ephemeral stream channels or drainages and alluvial fans. Surface grading and removal of vegetation would disturb these surface water features, disrupt flows in ephemeral stream channels, and alter drainage patterns. Impacts include (1) increased risks of flooding on site and downstream from increased surface flows to the major washes; and (2) impacts on water quality, primarily from transport of sediments (but also from dust), and also due to potential chemical releases from equipment or herbicides.

The overall changes in site drainage from the Project are addressed under the heading “Operation and Maintenance.” Sedimentation would be the primary effect of the Project on downstream water quality. The downstream water quality impacts from sedimentation caused by stormwater runoff could be greatest during Project construction, as construction involves continuous soil disturbance. In accordance with the Construction Stormwater General Permit NVR100000, a SWPPP would be prepared and implemented during construction, which would include installation of site-specific erosion control BMPs as part of the site preparation process. BMPs include, but are not limited to, controlling water runoff and directing it to temporary settling basins during construction; minimizing vegetation removal only to areas of active construction; recontouring and revegetating Project roads that are no longer needed to increase filtration; and using temporary stabilization (e.g., erosion matting blankets, soil stabilizing agents) for areas that are not actively under construction. The Project BMPs would be implemented throughout construction to minimize erosion and subsequent sedimentation of the main washes that could impact downstream water quality. Adverse effects to downstream water quality from sedimentation caused by construction would be minimized but not eliminated.

During construction, fuel, herbicide, and other chemical spills and accidents could occur. An SPCC Plan would be developed prior to construction in accordance with regulations, which would address spills associated with fuel tanks. A SWPPP would also be prepared, which would establish procedures to minimize the effect of accidental releases of other hazardous materials on water quality. Herbicides would only be applied in accordance with a PUP to ensure that water quality is protected. Although spills could still occur, the likelihood of occurrence is considered low. Effects would be short-term and localized if a spill were to occur and would not have lasting effects on regional water quality. Up to four 1-acre ponds would be created to hold water during construction, which would primarily be used for dust control. Water could be sourced from an on-site well or a pipeline from the Moapa Paiute Travel Plaza, or trucked to the Project site. The ponds would be designed with a liner and berms to ensure that the water remains only in the ponds. The ponds could overflow and increase runoff and sedimentation of waterways during a storm event. Per MM Water Resources (WR)-2, the ponds would be designed with appropriate freeboard and/or spillways and flow dissipation to ensure that water is held or properly discharged during a storm event, without causing excessive sedimentation. Construction of the Project would not generate or cause the transport of any other constituents for which the Muddy River does not meet standards. Project construction would not change pH, dissolved oxygen, or temperature in the Muddy River due to the intermittency of the flows and the distance between the site and the Muddy River. The Project would not generate nitrites, nitrates, dissolved solids, E. coli, or any substances that could change the color of the Muddy River.

Operation and Maintenance – *Changes in Flows and Flooding*

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Overview. Jurisdictional drainages (discussed further in Section 3.6: Vegetation and Jurisdictional Waters) are the most incised washes on the Project site. These drainages would be left mostly unaltered during construction, except for road/utility crossings, an occasional solar panel post, and drainage facilities (including berms and channels). Post-construction flows would follow the same flow paths or drainage patterns through the site as they followed prior to construction. A denser network of incised drainages is found in development area D. Some of these drainages might require filling and rerouting to improve constructability while also providing flow paths through the site to minimize flooding. MM WR-1 requires avoidance of placement of materials and fill into jurisdictional drainages, to the greatest extent feasible. If filling and rerouting of jurisdictional drainages were to become necessary during final engineering, justification for the rerouting would be required by the BLM and USACE.

Flooding that could cause substantial damage on or off site is not anticipated under most conditions. Flows would remain confined in established washes for most storm events at the 10-year storm event level and below. Flood flows from the 100-year storm event are analyzed here as the likely worst-case scenario. Figures 3.5-3 and 3.5-4 present the 100-year, 6-hour pre- and post-Proposed Action development flow rates and depths, respectively, for the Project site, given removal of all vegetation over the site and maintenance of the existing drainage network.

For simplicity, the maximum peak rates and flow depths for the six different storm scenarios/ subwatersheds (West Tributary, California Wash, East Tributary, and East Washes 1 through 3) were combined onto a single exhibit covering the entire watershed, reflecting pre- and post-development conditions. Flow depths are indicated for each cell in increments of 0.5 feet (0.2 meter) from 0 to 2 feet (0 to 0.6 meter) deep and increments of 1 foot (0.3 meter) for depths greater than 2 feet (0.6 meter). Lighter blues in the figures indicate shallower flow and purple/pink indicate deeper flow. The West Tributary, California Wash, and East Washes 1 through 3 would require remapping under FEMA of post-construction flows. Table 3.5-1 provides a summary of the pre- and post-development flow for each wash.

Table 3.5-1 Pre- and Post-Development 100-year Flows for the Major Washes in the Project Area

Location	Flow Rate, cfs (cms)	
	Existing Flows at the Site Boundary	Post-Development Flows at the Site Boundary
West Tributary	354 (10)	417 (12)
California Wash	3,485 (99)	3,922 (111)
California Wash/ East Tributary	1,965 (56)	1,951 (55)

Source: (Louis Berger 2019)

West Tributary. The alluvial fans of the West Tributary have incised channels and are not subject to significant channel migration or flow shifts. The channels combine in the West Tributary Wash, which is identified by the FEMA flood zone between development area A to the west and development area B to the east. The portion of development area B closest to the mountain front (in the southern Project area) is subject to concentrated flow. Channels and/or berms are proposed along the western boundary of development area B (refer to Figure 2-3) to direct concentrated flow away from the arrays and to contain the flow in the West Tributary. Downstream of the Project site, the West Tributary flows through a 12-foot (3.7-meter) by 4-foot (1.2-meter) reinforced concrete box culvert (RCB) near the Moapa Paiute Travel Plaza. Stormwater flows in the West Tributary could increase if development area B were fully

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cleared of vegetation. A collector channel/berm and detention basin are included as part of the Proposed Action to capture runoff from development area B and meter outflow into the West Tributary. The purpose of the detention basin is to reduce any increase in the peak runoff flow to the Valley of Fire Road RCB crossing of the West Tributary that might occur due to site development. The channel and detention basin would minimize risk of on-site and off-site flooding and overtopping Valley of Fire Road. The channel/berm would be lined with an erosion-resistant material such as soil cement or riprap. The modeling evaluated the change in flows, which showed an increase (refer to Table 3.5-1) in the likelihood of a 100-year storm event with the berms and detention basin in place. Although site development would increase the runoff flow rate leaving the West Tributary northern boundary, the difference in flow depth in the West Tributary between pre- and post-development in the wash is approximately 1 inch (2.5 centimeters), which is negligible. The RCB could accommodate the flow under the 100-year storm event. Adverse effects are not anticipated. An access road for the gen-tie lines would be constructed through the West Tributary. The access road would be constructed as a low-water crossing, designed to be crossed by high flows in storm events. This road would likely require periodic repair after very large storm events. The crossings would be designed to reduce the potential for damage and for transport of road material downstream, and would require permits from the USACE if constructed with fill material. Road crossings would not result in constriction of flows or otherwise affect flows within the washes.

California Wash and East Tributary. High flows are released into the California Wash and East Tributary in 100-year storm events. The East Tributary flows through development areas D and E and into the California Wash. The California Wash is incised at the mountain front and flows are contained within the wash banks. Like the West Tributary subwatershed, the alluvial fans of the California Wash and East Tributary are characterized by incised channels indicative of an abandoned fan surface that is not subject to significant channel migration or flow shifts. During large storm events, flows would not reach depths that could cause substantial flooding over development areas D and E, as the flows would remain in incised channels or, as previously discussed, rerouted channels (if permitted).

One exception to this condition occurs in the lower reach of the California Wash where the wash loses its banks and flow breaks out across development areas B and C as overland flow under existing conditions (visible in Figure 3.5-3 as the dark purple and pink in these development areas). The main branch of the California Wash coincides with the FEMA SFHA Zone A. Valley of Fire Road is at grade between development areas B and C, and all flow conveyed within the California Wash overtops the road. The road profile dips where flow from the main branch crosses. At the northern (downstream) boundary of the Project, the peak storm flow under pre-development conditions would decrease under post-development conditions (refer to Table 3.5-1). The flow depth in the main branch of the California Wash in a 100-year storm event at the Project's north boundary is approximately 3 feet (0.9 meter) under both pre- and (modeled) post-development conditions. It is estimated that the main branch has conveyance capacity equivalent to roughly a 10-year flood event. Flow in excess of main branch capacity breaks out across the west bank of the wash and flows through development areas B and C as overland flow.

The overland, post-development breakout flow of the California Wash in a 100-year storm event would be greater than the pre-development flow (refer to Table 3.5-1). While development of the Project would increase the flow under the 100-year storm event, the flow would be distributed over 1 mile (1.6 kilometers) across the site boundary, following the contours on the surface that would be maintained during construction of the facility. That is, the overland flow path of breakout flow would be expected to remain the same or similar before and after construction. The maximum difference in flow depth across the breakout flow area at the northern Project site boundary is approximately 1 inch over that 1 mile (2.5 centimeters over 1.6 kilometers), which is negligible. The flows would continue in small washes or as

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overland flow until they converge into the West Tributary of the California Wash approximately 1 mile (1.6 kilometers) to the north of the Project boundary on the Moapa River Indian Reservation. From there, the main branch of the California Wash flows to the Muddy River approximately 13 miles (21 kilometers) further north, crossing under I-15 approximately 6 miles (10 kilometers) north of the Project boundary. In 2014, a large flash flood resulted in the washing out of I-15 where the California Wash crosses under it. Increased flow in the California Wash could add to substantial flood damage, sediment deposition, and erosion during very large storm events; however, such events are anticipated to be rare, with a 1 percent chance per year.

Within the solar development areas, the breakout overland flows in development area B could cause significant flood damage. The main branch of the California Wash could avulse (change flow path) as a result of sudden deposition and/or side bank erosion. No drainage facilities are proposed to be constructed on the California Wash due to the presence of sensitive environmental resources (the state listed endangered threecorner milkvetch and archaeological sites) that could be adversely impacted by construction and/or increased flow in the wash and surrounding areas (i.e., the floodplain). To minimize the extent of possible damage to the solar facility from breakout overland flows, MM WR-1 requires solar panels and electrical equipment to be elevated above the 100-year flood depth (approximately 3 feet [0.9 meter]) in the affected development areas B and C, and foundations are designed to support against potential scour. Flood depths would not increase substantially in development areas D and E as drainage contours would be maintained or else rerouted with approval by BLM and USACE during final engineering, per MM WR-1. MM GS-1 in Section 3.3: Geology, Soils, and Mineral Resources requires erosion control and bank stabilization devices to be installed in and around on-site and off-site washes (subject to appropriate permits). The measure also requires routine site inspections to identify and repair areas of erosion such as deep rills and gullies in the panel arrays and to maintain, change, or add additional erosion control features if needed (in accordance with required permits). Mitigation would minimize the adverse impacts of erosion and scour from increased site flows and flooding across the solar facility.

One access road for a collector line would be constructed through the California Wash. The access road would be constructed as an Arizona crossing, allowing stormwater flows to overtop the road. This road would likely require periodic repair after storm events. The crossings would be designed to reduce the potential for damage and transport of road material downstream, and would require permits from the USACE to construct if construction involved placement of fill in the wash, as well as the NPS (as the California Wash can be used to experience the OSNHT). Road crossings would not result in constriction of flows or otherwise affect flows within the washes.

Gen-Tie Lines. Gen-tie towers or poles would occupy a small surface area. They would not be expected to result in substantial changes in surface water flows that could cause off-site flooding, and would not impact 100-year floodplains (Louis Berger 2019). Access roads would be approximately 20 feet (6 meters) wide and covered with an aggregate substrate where needed, as required by NV Energy. The access roads would result in approximately 26 acres (11 hectares) of vegetation removal, but would be constructed to largely follow land contours. Washes would cross over the gen-tie access roads. To minimize adverse effects to incised drainages (and thus potential waters of the United States) from direct fill, jurisdictional waters would be avoided during access road construction, per MM WR-1. Fill would only be allowed if unavoidable and would require permitting through USACE. Some minor alteration of flows could occur from changes in runoff patterns due to the access roads, but would be localized and away from any structures or infrastructure that could be adversely affected.

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Impacts on Surface Water Quality. The clearing of vegetation on the Project site under the Proposed Action would result in increased transport of sediments associated with increased flows. This sediment would flow within the California Wash and its tributaries, and would likely deposit at a point downstream. Sedimentation downstream of the West Tributary would be minimal, however, because of the addition of the detention facility that would collect sediment and meter flows. No effects on downstream structures from sedimentation or sediment deposit, including the RCB, are anticipated. Sedimentation would likely increase in the overland flow areas along the California Wash and East Tributary. During the largest storm events, the California Wash transports an enormous amount of sediment. Sediment transport and deposition is part of the natural geomorphic processes in the desert. No land uses (for example, structures, agricultural uses, or mining) that could be impacted by sediment deposition are located within 13 miles (21 kilometers) of the Project's northern boundary. The contribution of sediment would be minor compared with the sediment transported along the remaining 13 miles (21 kilometers) of the California Wash to the point where it converges with the Muddy River. Impacts of increased sediment transport are not anticipated to be adverse or to have substantially different impacts on water quality in the Muddy River than under existing conditions.

Dust palliatives may also be used during Project O&M (and potentially during construction). BLM has allowed the use of a few dust palliatives on an experimental basis on other projects within the Southern Nevada District. The soil binder/dust palliatives previously allowed by the BLM are as follows:

- 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

Herbicides might also be used during Project O&M. Dust palliatives and herbicides can mobilize into stormwater and cause downstream water quality impacts. To minimize those impacts, MM WR-2 requires a Stormwater Quality Monitoring Program that involves using BLM-approved dust palliatives, periodically testing stormwater quality to verify that impacts are not occurring, and making changes to the applications that minimize effects if identified. The program would specify the testing procedures for stormwater quality, frequency, constituents tested, and reporting requirements, including the agencies to which the results must be reported. If standards for water quality are exceeded, the monitoring program requires modification to the palliative use in consultation with BLM. Herbicide would only be used in accordance with a PUP and Integrated Weed Management Plan and in accordance with BLM Manuals, and as covered under the RODs for both the BLM's PEIS for Vegetation Treatments, as detailed further in Chapter 2: Proposed Action and Alternatives (BLM 2016c, BLM 2007). Adverse water quality effects would be minimized with implementation of the mitigation.

Gen-tie line roads could channelize water and increase localized erosion that could result in increased sedimentation of nearby washes, although the effects would be minimal given the limited acreage impacted by gen-tie access roads. MM GS-1 requires regular inspection and repair of erosion to minimize impacts.

O&M of the Project would not generate or cause the transport of any other constituents for which the Muddy River does not meet standards. Project O&M would not result in discharges that could change pH, dissolved oxygen, or temperature in the Muddy River due to the intermittency of the flows and the distance between the site and the Muddy River. The Project would not generate nitrites, nitrates, dissolved solids, E coli, or any substances that could be transported downstream and change the color of the Muddy River.

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Decommissioning. Decommissioning would include the removal of the solar facility and reclamation of the site back to natural conditions, as described in a Decommissioning Plan. Erosional impacts during demolition of the facility would be similar to those described for construction, and the same measures and BMPs would be implemented to minimize effects. Revegetation and recontouring of the land would reduce flow rates and erosion over the Project site and gen-tie access roads compared with the O&M phase of the Project.

Groundwater and Water Supply

Construction and Operation/Maintenance. *On-Site Groundwater Extraction.* Water for Project construction and operation could be purchased and accessed through construction of an on-site groundwater well. The well would be designed to produce up to approximately 250 gallons (950 liters) per minute. The approximate location of the well is shown in Figure 2-3. The use of the well would require a Change in Use, Manner of Use, and Point of Diversion from the State Engineer. Temporary transfers of existing water appropriations are allowed under Interim Order #1303, as previously discussed, following the State Engineers review process. Refer to the *Information Summary of Water Rights, Supply, and Use for the Gemini Solar Project* (Panorama Environmental, Inc. 2019d) for more information on the process. It is unlikely that the State Engineer would approve a temporary transfer of existing appropriations if it were to result in an increase in overall withdrawal from the carbonate aquifer beyond the levels of pumping in 2011 and 2012 that affected the Muddy River. Through the approval process with the State Engineer, systemwide impacts that could affect the Muddy River are not anticipated. Localized effects on groundwater levels could occur from drawdown associated with groundwater pumping on the Project site while the aquifer recharges. The results of modeling showed groundwater drawdown amounts, as listed in Table 3.5-2. The nearest wells in use are the Moapa River Indian Reservation municipal wells, approximately 8 miles (13 kilometers) north of the Project's well site. The Muddy Mountains spring is over 4 miles (6.4 kilometers) south of the Project well site. At these distances, even during peak drawdown, which would occur right after the end of construction, the amount of drawdown would be imperceptible at these locations. Groundwater pumping for Project construction and operation is not expected to have any effects on surrounding groundwater users or springs. MM WR-3 requires installation and monitoring of a water meter at the well to ensure that pumping throughout construction does not exceed 2,000 acre-feet (246.7 hectare-meters) and 20 acre-feet (2.5 hectare-meters) per year during operation. The mitigation measure also requires development and implementation of a Groundwater Monitoring and Reporting Plan to document pre-construction baseline groundwater conditions, guide groundwater monitoring and reporting, and document groundwater use.

Off-Site Water Supply. An off-site source of water for both construction and O&M could be purchased as an alternative to on-site extraction. The water would come from an existing source and would be trucked to the Project site. Water could also be purchased from existing appropriations held by the Moapa Band of Paiutes and delivered to the Project site through a new water pipeline connecting to the Moapa Paiute Travel Plaza well. If water is purchased from a currently appropriated source and trucked or piped to the Project site, localized groundwater impacts could still occur (if a greater amount of water is pumped than currently). The diversion would be subject to the approval of the State Engineer and any conditions placed on the water right holder to minimize effects.

Decommissioning. Decommissioning could require water at levels similar to construction. Impacts would be similar to those shown for construction with the peak drawdown happening right at the end of decommissioning and subsequent rebound once pumping has ceased. Other technologies or methodologies could also reduce or eliminate the need for water for decommissioning 30 years into the future.

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Table 3.5-2 Groundwater Drawdown Simulation Results

Distance from Pumping Well, miles (kilometers)	Maximum Drawdown, feet (meters)	Elapsed Time at Maximum Drawdown¹	Drawdown at 30 Years of Operation, ² feet (meters)
0.5 (0.8)	5.5 (1.7)	2 years, 5 months	0.78 (0.24)
1.0 (1.6)	1.7 (0.5)	3 years, 11 months	0.60 (0.18)
2.0 (3.2)	0.47 (0.14)	11 years, 11 months	0.38 (0.12)
Notes:			
1. Months after start of construction pumping.			
2. Drawdown 30 years from start of construction (at the end of Project operation)			

Groundwater Quality and Groundwater Recharge

Little recharge occurs in the Project area due to limited precipitation that contributes very little to the groundwater basins. Most of the groundwater in the area is from recharge over the Sheep Range, located about 20 miles (32 kilometers) west of the Project site, and subsurface in-flow from Coyote Springs to the north (Ninyo and Moore 2019). The Project would have no impacts on groundwater recharge.

If groundwater were to be used for the Project’s construction, O&M, and decommissioning, considerations should be made for groundwater quality. Water quality studies of the Carbonate-Rock Aquifer of the Great Basin were performed by the USGS in 2003 (USGS 2003). The studies found that the groundwater in the southern part of the Colorado Flow System, where the LWRFS is located, grade from calcium-bicarbonate water to calcium-sulfate water with an increase in chloride (USGS 2003). The groundwater would primarily be used for dust suppression on denuded surfaces. Water would likely evaporate quickly from the application surface. Areas requiring dust suppression would not be areas with vegetation, so water quality would not impact plant growth. The water used would have similar chemistry to the water in the Muddy River, which is sourced from springs from the carbonate aquifer that feed the Muddy River. Groundwater quality impacts and impacts from groundwater on surface waters would be negligible.

Residual Effects

Implementation of the mitigation measures, erosion control BMPs, and a SWPPP would reduce potential adverse effects from flooding or increased erosion and sedimentation caused by construction, O&M, and decommissioning. Implementation of the mitigation measures would not be expected to result in any unaccounted-for effects. Residual erosion effects from construction, O&M, and decommissioning would be limited to some increases in downstream transport of fine sediment. Residual increases in peak flows could occur even with mitigation. Residual groundwater effects would not occur as groundwater would eventually recharge. No new water rights or appropriations are anticipated.

Cumulative Effects

Surface Water Resources. Several linear cumulative projects (#19, #21 from Table 3.0-2) would be constructed within the same watershed as the Proposed Action and involve ground-disturbing activities. Construction activities for these projects would disturb narrow, linear areas and would not substantially increase erosion and sedimentation. The cumulative projects would involve installation of facilities such as steel lattice towers that would only nominally increase impervious surfaces. New access roads would be constructed, requiring vegetation removal. Compared to the overall area within the watershed,

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vegetation removal would not result in a noticeable increase in overland flows or sedimentation of waterways. No cumulative adverse effects on water resources would occur.

Groundwater. Several of the cumulative projects (#1, #8, #9, #12, #19, #21, #24 from Table 3.0-2) might also require groundwater for dust suppression. The sources of water for these projects are not known, and the timing of construction might or might not overlap with that of the Project. If water for those projects were to be withdrawn from the LWRFS, a cumulative impact on the regional aquifer system and the Muddy River could occur. Per Interim Order #1303, the State Engineer has placed a moratorium on new water appropriations in the flow system until a sustainable yield amount can be determined. The other projects might also obtain a temporary Change in Use of existing appropriations. The process for obtaining the temporary Change in Use would include consideration of cumulative amounts of groundwater withdrawn from the flow system. Temporary Change in Use authorization are typically granted for one year at a time, and construction water durations are usually short, reducing the potential for large overlaps in construction water needs. The USFWS also tracks any groundwater pumping under a 2006 Biological Opinion (1-5-05-FW-536) in the California Wash Basin (as well as other basins in the flow system) to ensure that water at the Warm Springs gauge flowing into the Muddy River does not flow below 2.7 cfs (0.08 cms). These controls would minimize the potential for cumulative impacts. If cumulative effects caused flows to fall below 2.7 cfs (0.08 cms), a reduction in pumping across multiple projects might be required. The Applicant would have to secure alternative sources of water, such as through the purchase of water trucked to the Project site, or would have to modify construction to meet dust control requirements. The Project's operational water needs would be minimal and not likely to contribute to a cumulative impact.

All Mowing Alternative

The All Mowing Alternative would result in reduced potential for on- and off-site sedimentation that could impact water quality and reduced potential for on- and off-site flooding compared with the Proposed Action, because the facility would be constructed to leave the vegetation in place under the solar arrays (mowing method of construction). This alternative would reduce erosion and runoff effects, as most of the site would be left vegetated. Runoff flows would be most similar to existing conditions, and for the purposes of this analysis are assumed to be the same. MMs WR-1, WR-2, WR-3, and GS-1 would still apply to the Project to minimize effects related to erosion and flooding. The stormwater detention basin would not be required under this alternative. Table 3.5-3 identifies the pre- and post-development 100-year estimated flows for the All Mowing Alternative. Impacts on incised and functional drainages would be reduced as fill of jurisdictional drainages would be completely avoided except for access road crossings, utility trenching, posts, and installation of erosion control measures (noting that access roads would be more frequent across the site, resulting in potentially more crossings). Erosion control measures, including berms or channels that could impact desert tortoise, would not be allowed. No rerouting of drainages would be needed or allowed, per MM WR-1. The densest network of jurisdictional drainages in the lower part of development area D is not included for development in this alternative.

Groundwater use could be reduced for this alternative as less water might be needed for dust control in mowed areas; however, for the purposes of analysis, the same amount of water need was used to calculate effects from the alternatives. Most of the needed water would be for dust suppression on access roads during construction. Groundwater impacts would be the same or reduced compared with the Proposed Action.

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Table 3.5-3 Pre- and Post-Development 100-Year Flows, cfs (cms)

Location	Existing	Proposed Action	Flow Rate, cfs (cms)	
			Hybrid Alternative	All Mowing Alternative
West Tributary	354 (10)	417 (12)	375 (11)	354 (10)
California Wash	3,485 (99)	3,922 (111)	3,805 (108)	3,485 (99)
California Wash/ East Tributary	1,965 (56)	1,951 (55)	1,937 (55)	1,965 (56)

Residual sedimentation impacts would be less than the Proposed Action. No residual effects on groundwater occur as with the Proposed Action.

Cumulative impacts would also be the same as the Proposed Action, or slightly reduced. No cumulative adverse effects on surface water or groundwater resources would occur.

Hybrid Alternative

Potential flooding and water quality impacts from sedimentation from the hybrid Alternative would be similar to those described for the Proposed Action. Modeled flow rate changes in existing major washes are shown in Table 3.5-3 and Figure 3.5-5. MMs WR-1, WR-2, WR-3, and GS-1 would also apply to this alternative. Both erosion and flooding effects would be reduced under this alternative compared to the Proposed Action due to the reduced soil and vegetation disturbance over 65 percent of the site. Impacts to incised and functional drainages would be reduced as fill of jurisdictional drainages would be completely avoided except for access road crossings, utility trenching, posts, and installation of erosion control measures (none of which would include berms or channels that could impact desert tortoise in mowed areas). Development area D would be mowed, as such, no filling or rerouting of drainages would be required or allowed, per MM WR-1.

Groundwater use could be reduced for this alternative as less water might be needed for dust control in mowed areas; however, for the purposes of analysis, the same water needs were used to calculate effects from the alternatives. Most of the needed water would be for dust control on access roads during construction. Groundwater impacts would be the same or reduced compared with the Proposed Action.

Residual sedimentation impacts would be less than the Proposed Action. No residual effects on groundwater occur as with the Proposed Action.

Cumulative impacts would also be the same as the Proposed Action, or slightly reduced. No cumulative adverse effects on surface water or groundwater resources would occur.

No Action Alternative

The Project would not be developed under the No Action Alternative. No effects would occur.

Mitigation Measures

- MM GS-1: Operation and Maintenance Erosion Control (from Section 3.3: Geology, Soils, and Mineral Resources)
- MM WR-1: Elevation of Solar Facilities in Floodplain Areas, Avoidance of Jurisdictional Drainages (from Section 3.5: Water Resources)
- MM WR-2: Stormwater Quality Monitoring Program (from Section 3.5: Water Resources)

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3.5 Water Resources

- MM WR-3: Surface Treatment (from Section 3.5: Water Resources)

3.6 Vegetation and Jurisdictional Waters

3.6.1 Affected Environment

Introduction

This section describes the environmental setting, vegetation communities, invasive weeds, special status plant species, forestry and woodlands (specifically, cactus), and state and federal jurisdictional waters that are present within the Project area. It also lists the special status plant species that were observed or have potential to occur on the Project site. This section is based on the information provided in the *Botanical Resources Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018a) and the *Jurisdictional Delineation Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018d).

Data presented in this section are interpreted from belt transect data presented in Figures 3.6-1 through 3.6-10. Belt transects are used in biology to estimate the distribution of species in relation to a certain area. These types of surveys record all the individuals of the target survey species found between two lines. The results can be used to extrapolate the expected number of individuals in the area encompassing the belt transects.

Several regulations and laws apply to the botanical, vegetative, and jurisdictional resources on the Project site, including the federal Endangered Species Act, the BLM Manual 6840 – Sensitive Species Management, the Nevada Administrative Code that authorizes the Nevada Division of Forestry to establish “fully protected” native plant species, and Sections 401 and 404 of the Clean Water Act. Other regulations and laws pertaining to vegetation, invasive weeds, special status plant species, and jurisdictional waters are described in Appendix E.

Data Source and Methodology

A literature review was performed, and a botanical survey was conducted on April 2 to 7, April 9 to 14, April 30, and May 1 to 12, 2018, and an aquatic resource delineation was conducted on September 5, 2017, to October 12, 2017 and May 28 to 31, 2018. A follow-up botanical survey was conducted in September 2018 to detect plants that may have emerged after monsoon rainfall, subsequent to the botanical survey conducted in spring of 2018. The methods and results of these studies are documented in the *Botanical Resources Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018a) and the *Jurisdictional Delineation Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018d).

Analysis Area

The analysis area, also referred to as the study area in this section, includes all development areas for the Proposed Action and alternatives, a buffer area of 656 feet (200 meters) surrounding the solar development areas, and all proposed gen-tie lines. This is the area in which direct effects and indirect effects to vegetation could occur. A total area of 10,910 acres (4,415 hectares) was considered.⁸

⁸ Development area F was considered as part of the study area to develop alternatives but was not incorporated into any of the alternatives carried forward in the EIS due to the presence of a large population of and high-quality habitat for the state-endangered threecorner milkvetch.

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Baseline Description

Topography, Climate, and Soils

The Project site is in the northeastern portion of the Mojave Desert. The topography within the Project area is a gently sloping bajada (alluvial material at the foot of a mountain), except for badlands just outside the western side of the Project site (near Crystal Substation). Multiple braided, intermittent washes flow northward through the Project area and connect into the California Wash. The topography to the north is relatively flat as the California Wash subwatershed meanders to the northeast while combining with multiple intermittent washes prior to connecting to the Muddy River, approximately 13 miles (21 kilometers) away and, ultimately, flowing into Lake Mead. The climate is typical of the northeastern Mojave Desert and is characterized by arid conditions and dramatic daily and seasonal temperature fluctuations. Most rainfall occurs from December through March and snow is very uncommon; summer rainfall occurs regularly, typically in July and August.

Vegetation Communities

The vegetation communities found on the Project site are characteristic of lower to mid-elevations throughout the region (Figure 3.6-11). Four natural vegetation communities occur within the study area (refer to Table 3.6-1): creosote-white burrobush (*Larrea tridentata* - *Ambrosia dumosa*) shrubland alliance, shadscale (*Atriplex confertifolia*) shrubland alliance, big galleta (*Pleuraphis rigida* [*Hilaria rigida*]) herbaceous alliance, and Catclaw Acacia (*Acacia greggii* [*Senegalia greggii*]) shrubland alliance (Peterson 2008) (Sawyer et al. 2009). Badlands were mapped along the gen-tie lines. The creosote-white burrobush alliance is the most common vegetation type throughout the BLM’s Southern Nevada District but is also the most impacted due to expansion of urban areas (e.g., Las Vegas, Pahrump), BLM realty actions, land transfers, extensive and intense OHV use, and wildfires perpetuated by non-native annual grasses. Slow recovery from disturbance means impacts to this vegetation community accumulates over time.

A complete list of all plants observed during the botanical survey is included in Appendix C of *The Botanical Resources Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018a). Table 3.6-1 shows the vegetation communities that cover the study area.

Table 3.6-1 Vegetation Communities in the Study Area

Vegetation Community	Dominant Species	Percent of the Study Area
Creosote-white burrobush shrubland alliance	creosote and white burrobush	93%
Shadscale shrubland alliance	shadscale, desert holly (<i>Atriplex hymenelytra</i>), white burrobush, and alkali seepweed (<i>Suaeda nigra</i>)	5%
Big galleta herbaceous alliance	big galleta	<1%
Catclaw Acacia shrubland alliance	white burrobush, catclaw acacia, and creosote	1%
Badlands	vegetation is extremely sparse	<1%

Invasive Weeds

Noxious and non-native weed densities throughout the Project site are unusually high for the Southern Nevada District. Invasive weed species were recorded in the study area during the botanical surveys, including Sahara mustard (*Brassica tournefortii*), halogeton (*Halogeton glomeratus*), African mustard (*Strigosella africana*), Russian thistle (*Salsola tragus*), red brome (*Bromus madritensis ssp. rubens*), cheatgrass (*Bromus tectorum*), Mediterranean grass (*Schismus sp.*), red stem stork’s bill (*Erodium*

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cicutarium), Russian knapweed (*Acroptilon repens*), oat grass (*Avena sp.*), Chilean chess (*Bromus berteroi*), ripgut brome (*Bromus diandrus*), Malta starthistle (*Centaurea melitensis*), Bermuda grass (*Cynodon dactylon*), foxtail barley (*Hordeum murinum ssp. glaucum*), Timothy grass (*Phleum pratense*), prickly sow thistle (*Sonchus asper*), and salt cedar (*Tamarix ramosissima*) (Figure 3.6-12). Several of these species are also listed on the Nevada Noxious Weed List: Russian knapweed, Sahara mustard, Malta starthistle, and salt cedar. The three most common invasive weed species recorded were Sahara mustard, halogeton, and African mustard. The results of belt transect surveys for Sahara mustard and African mustard (weed species of greater concern) are shown in Figures 3.6-1 and 3.6-2. Non-native species that are problematic for both sensitive plant habitat and desert tortoise habitat are brome species, Mediterranean grass, and African mustard.

Sahara mustard has extremely high densities on the Project site, especially in sandier soils. It was found in the highest densities on the eastern portion of the Project site in development areas D and E. Sahara mustard is generally a better colonizer of sandy soils, which are also inhabited by threecorner milkvetch. Extrapolated densities of up to 1,370 individual Sahara mustard plants per acre (3,385 individuals per hectare) were identified in some areas. Estimated abundance is 54,602 Sahara mustard plants within the study area, with an estimated, average density of 80 Sahara mustard plants per acre (198 individuals per hectare). This is likely an underestimation because it is much more common in certain parts of the study area. Development areas A and E had the highest estimates of total weeds per acre; extrapolated as 1,057 and 1,369 weeds per acre (2,612 and 3,383 per hectare), respectively. New or expanded populations of several invasive weed species were found during road surveys, including Sahara mustard, red brome, cheatgrass, Malta starthistle, halogeton, London rocket (*Sisymbrium irio*), African mustard, and salt cedar.

The proximity of the Project site to I-15 has led to vectors of weeds into the Project area. Weed vector data are shown in Figures 3.6-13 through 3.6-16.

Cacti and Yucca

Eight species of cacti occur in the study area: silver cholla (*Cylindropuntia echinocarpa*) (~61,441 individuals), pencil cholla (*Cylindropuntia ramosissima*) (~2,048 individuals), cottontop cactus (*Echinocactus polycephalus* var. *polycephalus*) (~1,679 individuals), strawberry hedgehog (*Echinocereus engelmannii*) (~1,196 individuals), beavertail (*Opuntia basilaris* var. *basilaris*) (~144,447 individuals), desert barrel cactus (*Ferocactus cylindraceus*) (~16 individuals), common fishhook cactus (*Mammillaria tetrancistra*), and Johnson's fishhook cactus (*Sclerocactus johnsonii*). One species of yucca, Mojave yucca (*Yucca schidigera*) (~32 individuals), occurs in the study area. Development areas D and E has much higher densities of cactus and yucca than other areas. Total numbers are extrapolated from belt transects within different vegetation types. Figures 3.6-4 through 3.6-8 show the belt transect results for the five most frequently found species of cactus in the study area.

Biocrust and Desert Pavement

Biocrust, or biological soil crust, is a surface crust composed of living organisms such as bacteria, algae, fungi, lichen, and moss. These organisms are important to the functioning of ecosystems and the organization of plant and soil communities. Biocrusts also prevent dust and soil from wind or water erosion. Biocrusts are sensitive and can take decades to recover after disturbance (Chandler 2019). Desert pavement is a feature of the ground surface in deserts composed of a closely fitted, single layer of rock fragments over fine sand and/or silt; this layer traps dust particles over time that settle beneath the rock layer and form a vesicular horizon below the pavement. An estimated 414 acres (168 hectares) of biocrust and 524 acres (212 hectares) of desert pavement are likely to occur on the Project site, based on the belt transect results. Development area B had the highest estimated percent cover of biocrust at 270 acres (109

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hectares). Development area D had the highest estimated percent cover of desert pavement at 178 acres (72 hectares), followed by development area B at 301 acres (122 hectares). The belt transects results for biocrust and desert pavement are shown in Figures 3.6-9 and 3.6-10. The *Botanical Resources Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018a) provides a complete explanation of the transect methods and results.

Special Status Plant Species

Three taxa of special status plants—threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*), Nye milkvetch (*Astragalus nyensis*), and rosy two-tone beardtongue (*Penstemon bicolor*)—were positively identified within the study area during the Spring 2018 special status plant inventory (Phoenix Biological Consulting 2018a). Figure 3.6-17 shows the general locations and densities of rare plants found during surveys.

Threecorner milkvetch is the rarest of plant species found in the study area. It is listed by the State of Nevada as Critically Endangered/Fully Protected, by BLM as Sensitive, by the Nevada Natural Heritage Program (NNHP) as At-Risk, and by the Nevada Native Plant Society (NNPS) as Threatened. It is also a MSHCP-covered species, to which BLM is a signatory agency. Threecorner milkvetch is a former Category 2 candidate for threatened or endangered status under the Endangered Species Act of 1973. The last ruling on the status of this species was published in the Federal Register on September 30, 1993, where it was determined that the threecorner milkvetch proposal for listing may be appropriate but insufficient data on biological vulnerability and threats were available to support the listing at that time (USFWS 1993, USFWS 2009). The MSHCP calls for “no net loss” of habitat for this species.

Threecorner milkvetch typically occurs in dynamic sandy soils such as dunes and open, deep sandy soils typically stabilized by vegetation and/or a gravel veneer with creosote (Barneby 1964, NNHP 2001). The habitat is restricted to the northeastern Mojave Desert, known only to be found in Clark County in southern Nevada and in the far northwest corner of Mohave County, Arizona, at elevations from 1,100 to 2,400 feet (335 to 732 meters) (NPS 2010). The varietal name “*triquetrus*” refers to the three-sided inflated seedpod of the variety that are well-suited for wind dispersal. Known occurrences are grouped into 17 population groups centered on the confluence of the Muddy and Virgin rivers. Clark County represents the vast majority of the species' known global distributions (16 of the 17 populations groups) and, therefore, is crucial for its management and long-term survival. The species is limited to the eastern portion of Clark County and occurs along the Muddy and Virgin rivers and Overton Arm from Sandy Cove to Middlepoint to Mormon Mesa, in Dry Lake Valley, California Wash, Gold Butte, and Mesquite. There are 16 population groups in Clark County. Two of the 16 population groups are almost entirely within energy corridors. One population is in Logandale Trails (one of BLM’s most popular recreation areas). Another population is almost entirely within a disposal boundary adjacent to the city of Logandale, Nevada, and BLM has several applications for ROWs that would permanently disturb habitat in this area, thus adding to the cumulative impact.

Threecorner milkvetch and its habitat are subject to numerous threats resulting from anthropogenic activity, including rural development and sprawl, casual vehicle use and trail development, energy development, surface water development, invasive plant species, utility corridor construction and maintenance, agriculture practices, inundation and shoreline fluctuation, federal land disposal, commercial development, livestock grazing management, sand and gravel mining, wild horse and burro management, legal recreation use, and legal off-highway use. These activities have reduced size and extent of populations and habitats through direct mortality and loss or fragmentation of habitats. The composition of associated plant communities has been altered by these activities, thus reducing native

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plant cover and aiding the spread of weeds. Some activities have altered conditions of substrates through soil erosion and stabilization or destruction of soil crusts. These threats have caused interruption of sand deposition by wind and loss of sand depositions by fluvial processes. The spread of weeds has played a role in altering the soil moisture and fire regime for the plant communities.

Two habitat models were developed for threecorner milkvetch: (1) a 2018 model that uses known point locations with a variety of environmental factors (Nussear 2018), and (2) a 2011 model largely based on the obligate soil types of threecorner milkvetch habitat (Hamilton and Kokos 2011). The threecorner milkvetch habitat in the Project area predicted by the 2018 model and the 2011 model is shown in Figures 3.6-18 and 3.6-19, respectively. Threecorner milkvetch individuals were found in development areas as follows: 139 individuals in development area C; 11 individuals in development area D; and 4 individuals in development area E (Phoenix Biological Consulting 2018a). In development area F, 1,102 individuals were found; this area has been excluded from all alternatives because of the high densities of this species.

Field data from the Project surveys generally supports both model predictions of habitat for threecorner milkvetch, but plants were not found in all locations predicted by the 2018 model. According to this model, approximately 2,320 acres (939 hectares) of suitable habitat for threecorner milkvetch is in the Project area. According to the 2011 model, approximately 718 acres (291 hectares) of occupied habitat is within the Project area. The 2018 model could be a better predictor of potential habitat for threecorner milkvetch in the future, as water movement and aeolian processes that move sand can create new habitat areas. Because the 2011 model seems to be a better predictor of current threecorner milkvetch occupancy, it was used to analyze Project impacts to occupied threecorner milkvetch habitat.

Nye milkvetch is listed by the NNHP as At-Risk and is on the NNPS's Watch List. Nye milkvetch grows in the foothills of desert mountains, on calcareous outwash fans, on gravelly flats, and sometimes in sandy soil in Mojave Desert scrub vegetation communities. It is known only from Clark, Lincoln, and Nye counties in southern Nevada and far southeastern Inyo County, California, at elevations from 1,100 to 5,600 feet (335 to 1,707 meters). In Nevada, Nye milkvetch was previously known from 24 extant occurrences, with an estimated 1,126 individuals and two extirpated occurrences from those populations (NNHP 2001). During the special status plant inventory survey, 2,117 individuals within 653 occurrences of Nye milkvetch were identified in the study area, making it the largest known population in Nevada (Morefield 2019). The highest number of occurrences and population numbers were found in development areas A and F, with 948 individuals in 179 occurrences in development area A and 677 individuals in 341 occurrences in development area F.

Rosy two-tone beardtongue is listed by BLM as Sensitive, by the NNHP as At-Risk, and is on the NNPS's Watch List. This is a short-lived perennial herb in the Plantain Family (*Plantaginaceae*) and grows in rocky calcareous, granitic, or volcanic soils in areas that receive enhanced runoff, such as washes, along roadsides, in rocky areas such as scree at the base of rock outcrops, rocky slopes, and rock crevices in creosote-burrobush, blackbrush (*Coleogyne ramosissima*), and mixed-shrub desert vegetation communities (NNHP 2001). It is known from Clark and Nye counties in southern Nevada and also from Arizona and California at elevations from 1,800 to 4,839 feet (549 to 1,475 meters). In Nevada, rosy twotone beardtongue is known from approximately 50 occurrences, with an estimated total of 6,049 individuals (NNHP 2001). During the special status plant inventory survey, two occurrences of this plant were identified in the buffer zone but none were found on the Project site.

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Jurisdictional Waters

The *Jurisdictional Delineation Report for the Gemini Solar Project* (Phoenix Biological Consulting 2018d) identifies 38 ephemeral, desert wash channels totaling approximately 106.7 acres (43.2 hectares) (218,250 linear feet [66,523 meters]) within the study area of 10,910 acres (4,415 hectares). A map of the aquatic resources delineation results is provided on Figure 3.6-20. In general, the jurisdictional drainages have steeper gradients, rocky (caliche) beds, and larger banks towards the southern end of the study area (development areas G, B2, and the southern portion of development area B). The northern study areas (development areas A, C, D, and E and northern portion of B) have drainages that have shallow gradients, silty or sandy sediment, and shallow banks. An approved aquatic resources delineation was received from the USACE on January 22, 2019. No wetlands are found within the Project area.

3.6.2 Environmental Consequences

Introduction

Permanent impacts refer to areas that are paved or otherwise precluded from restoration to a pre-project state for a decade or more. The definition of permanent impacts also reflects the slow recovery rates of plant communities in desert ecosystems, which could take a century to fully recover, if at all. All ground-disturbing activity, where plants are removed by the roots, is considered a permanent impact for the purposes of this analysis. Vegetation mowing is considered a temporary impact. Direct effects on vegetation include actions that unequivocally cause a reduction of total numbers of plants and/or reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat, which would include the entire 7,100 acres (2,873 hectares) in the Proposed Action. Indirect effects are impacts that occur not as immediate consequences of a Project-related action but are a reasonably foreseeable side effect related to the Project. Commonly, these indirect impacts are from soil disturbance that leads to the introduction, proliferation, and spread of non-native or invasive species that compete with native species and result in habitat degradation of surrounding undisturbed areas.

Proposed Action

Construction, and Operation and Maintenance

Native Vegetation Communities. Vegetation removal through disk and roll methods that crush and bury vegetation, as well as some limited grading, would occur across most of the Project site. Native vegetation would not regrow during Project operation. Construction of the Proposed Action would cause the direct and permanent loss of 7,097 (2,872 hectares) of vegetation and the habitat it provides within the Project site and along the gen-tie lines. Root structures would be removed, and soils would be highly disturbed and compacted such that impacts would be permanent.

The majority of lost habitat would be the creosotebush white bursage scrub vegetation community (6,524 acres [2,640 hectares]). Other vegetation communities that would be permanently impacted comprise smaller portions of the Project site, including 422 acres (170 hectares) of shadscale shrubland alliance and 77 acres (31 hectares) of catclaw acacia shrubland alliance. These vegetation communities also provide important habitat for wildlife species, from insects to birds to endangered species, including the Mojave desert tortoise, in addition to supporting native plants and sensitive plants. The vegetation types found on the Project site and the habitat they provide are common in southern Nevada but have been disproportionately impacted by ROW actions, OHV events and casual use, wildfires, and invasive species. MM Wildlife (WILD)-1 requires reduction of the solar facility footprint to only the minimum size needed for Project operation; however, substantial, permanent loss of habitat would still occur. The removal of habitat through disk and roll methods, which is considered permanent for the purposes of this

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analysis, is adverse. No method exists to minimize the direct adverse impacts to native vegetation communities within the Project site.

Indirect impacts from the Proposed Action are likely to include the proliferation of existing and new weed species outside of the Project site in adjacent undisturbed areas, which would result in a degradation of adjacent vegetation communities. Indirect impacts could also include additional fugitive dust, which can impede photosynthesis and other metabolic processes of native plants or increased or changed sedimentation from Project activities. Increases in surface water runoff from the Project site could also affect hydrologic characteristics of these communities. The introduction of contaminants into these downstream habitats could result from spills of fuels or other substances such as herbicides and dust palliatives used on the Project site. Herbicides used on site could drift off site and impact native plant communities or suppress restoration efforts after Project completion.

MM Air Quality (AQ)-1 requires soil stabilization measures to minimize air quality impacts from wind-blown dust. The Applicant would also be required to implement a Worker Environmental Awareness Program (WEAP), PUP, SWPPP, Stormwater Quality Monitoring Program, and SPCC Plan. Additional requirements for inclusion in a Site Restoration Plan and the Integrated Weed Management Plan are provided in MM Vegetation (VG)-1, including vegetation monitoring, responsibilities for treating weeds, requirements for pre-clearing of weeds prior to ground disturbance, treating and eradicating any new weeds discovered on-site, and monitoring of weed vectors (roads), among others. Herbicides would only be used in accordance with an approved PUP, as described in Chapter 2: Proposed Action and Alternatives. Indirect impacts (such as from spills, herbicide drift, spread of invasive weed species) could be reduced and sometimes minimized but would not be eliminated, even with mitigation. These indirect impacts, over a 30-year minimum period, are expected to extend at least within the 1-mile (0.4 hectare) impact buffer evaluated for these resources.

Special Status Plants. The Proposed Action would directly impact and remove 718 acres (291 hectares) of habitat for threecorner milkvetch, which is approximately 9 percent of the population group in this area, based on the 2011 model (Hamilton and Kokos 2011). The Project would directly impact 13 percent of the habitat of this population group within BLM management (some in this area occur on adjacent tribal land) (Southwest Ecology LLC 2018). The proposed action would result in a net loss of habitat for the threecorner milkvetch.

Through GIS analysis, BLM estimates that approximately 24,983 acres (10,110 hectares) of threecorner milkvetch habitat exists on BLM lands in southern Nevada, with a total of 40,646 acres (16,448 hectares) on all lands. Approximately 11,690 acres (4,731 hectares) of that original habitat have now been developed or are within ROW corridors or disposal areas. Approximately 29 percent of habitat is therefore developed or subject to development. The threecorner milkvetch population group that would be impacted by the Proposed Action is one of the largest areas of occupied habitat and is the largest area unimpacted by disposal boundaries, ROWs, and recreation. All populations on BLM land are threatened by OHV, noxious and non-native weeds, and development. Many of the populations on NPS land also have noxious and non-native weed problems.

Indirect impacts are assumed to occur within a mile-wide (0.4-hectare-wide) buffer of the entire Project site. Adverse, indirect impacts on threecorner milkvetch would occur from the proliferation of non-native weeds and introduction of new non-native weeds, herbicide use due to drift, and alteration of wash flows and potential loss of suitable habitat for population expansion. Given the buffer width of the Project site, approximately 3,439 additional acres (1,392 hectares) of threecorner milkvetch habitat would be

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indirectly impacted by the Proposed Action. Edge effects from disturbance and untreated weeds within disturbed areas would result in the proliferation of noxious and non-native weeds from the Project site to adjacent BLM lands. BLM does not have the resources to manage for increased presence of Sahara mustard and other weeds that are likely to proliferate outside the Project site as a result of the Proposed Action. Sahara mustard densities are highest in threecorner milkvetch habitat.

Indirect impacts from noxious and non-native weeds would result in long-term adverse impacts to threecorner milkvetch habitat outside the Project area. Direct and indirect impacts would affect 4,157 acres (1,682 hectares) of the estimated 8,233 acres (3,331 hectares) in this population group, or 50 percent. This population is the largest and least impacted of any of the population groups. Downstream impacts related to changes in ephemeral drainages, which provide the sandy soils the threecorner milkvetch requires, could impact an even larger proportion of this population group.

The combined direct and indirect disturbance associated with the Proposed Action would account for a loss or disturbance to 25 percent of threecorner milkvetch habitat remaining within BLM ownership (habitat not developed and not within a disposal boundary or ROW corridor). Accounting for this increase in lost or disturbed habitat, approximately 39 percent (up from 29 percent) of all habitat on BLM land would be lost.

Mitigating for threecorner milkvetch habitat loss is no longer possible. Habitat conservation is the method needed to ensure the long-term survival of this species. Threecorner milkvetch is currently state-listed as critically endangered. BLM's 6840 (Special Status Species Management) Manual states that "Bureau sensitive species will be managed consistent with species and habitat management objectives in land use and implementation plans to promote their conservation and to minimize the likelihood and need for listing under the ESA." Several other plants in southern Nevada have recently been proposed for listing due to development pressures. It is possible, given the magnitude of the impact of the Proposed Action on undisturbed habitat (from direct and indirect impacts), that USFWS may determine that a listing decision is warranted as a result of Project implementation.

Some actions would be taken to address some of the impacts caused by the Proposed Action, but these would not minimize or eliminate effects nor mitigate for the loss of habitat. MM WILD-1 requires minimizing the Project footprint to only the area needed for power generation, which would potentially reduce some direct impact acreage but not likely change indirect effects. MM VG-2 includes numerous provisions for threecorner milkvetch habitat, including obtaining a permit for take of plants from the Nevada Division of Forestry for any habitat within the Project site prior to any ground disturbance, collection of seeds prior to ground disturbance, bonding for the cost of seed collection and seed storage by an approved botanical garden, on-site monitoring, removal of Sahara mustard, completion of herbicide treatment prior to March 15 and only using hand pulling thereafter, no use of aminopyralid in modeled threecorner milkvetch habitat (and Nye milkvetch habitat), additional bonding, and WEAP training. Even with mitigation, direct impacts on occurrences and habitat of threecorner milkvetch would be adverse.

Nye milkvetch would be impacted through direct removal or crushing during disk and roll, and grading. The entire habitat for this species within the Project site would be removed. Removal would result in the loss of habitat for the largest known population of Nye milkvetch in Nevada. Indirect impacts would include potential introduction, spread, and proliferation of weeds. Herbicide drift and fugitive dust could also impact on-site and adjacent populations. Direct impacts on occurrences and habitat of Nye milkvetch would be adverse.

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Adverse, direct effects on rosy twotone beardtongue are not anticipated because only two occurrences were identified during the botanical surveys, and these were located outside of the development areas. Populations in adjacent habitats could be indirectly affected by fugitive dust.

Invasive Weeds. Soil disturbance increases the ability of noxious and non-native weeds to occupy an area. Construction vehicles accessing the site from I-15 could potentially introduce new species of invasive weeds to the Project area. Vehicles and crews could inadvertently track in clinging seeds and/or parts of invasive weeds, thus facilitating their spread through the Project site and adjacent habitats. The disk and roll construction method involves uprooting all existing vegetation and soils, followed by compaction into a flat surface. Because weeds are already common in the study area, the proposed soil disturbance would cause the site to become suitable habitat only for existing and potentially newly introduced weed species. With anticipated increased abundances from the Proposed Action, the weed density throughout the site could potentially triple, based on BLM experience after construction of other large-scale, soil-disturbing projects.

Without treatment, the Project area would be infested with a monoculture of non-native and noxious weeds that would spread to adjacent BLM lands and become a seed source for increased populations of noxious and non-native species. Invasive weeds would disrupt native plant communities, thus creating fire hazards, reducing biodiversity, and outcompeting and threatening special status species. The amount of herbicide needed to control weeds on the Project site after construction could kill the remaining native seed banks in the soil that survived construction disturbance. The BLM does not have funding to adequately address existing weed issues, and therefore, could not address increased weed densities caused by the Proposed Action. Weed increases are likely to affect sensitive plant habitat.

Effective treatment of weed populations must comply with stipulations, laws, and regulations. An Integrated Weed Management Plan and PUP would address weed management and be implemented during both construction and O&M of the Proposed Action. MM VG-1 requires that the Site Restoration Plan and Integrated Weed Management Plan include identification and treatment of problem weed areas before construction starts; monitoring of problem areas to detect new populations; treatment of weed populations; and implementation of prevention measures, including WEAP training, vehicle and equipment cleaning protocols, and construction reporting.

If control measures were not conducted or a treatment window was missed, weeds could proliferate and weed control costs could quickly become prohibitive. Weed species are responsive to seasonality, precipitation, and growing conditions. As a result, various weed species actively germinate year-round, which would require year-round weed maintenance of the site. Personnel conducting weed management would need knowledge of Mojave plant communities and weed ecology. In the experience of the BLM, this type of effort has not been successfully maintained by any large, site-type ROW in southern Nevada to date. If weeds are managed, there is still a high likelihood that edge effects from the Project would increase noxious and non-native weeds in the surrounding areas. Off-site effects would occur approximately 1 mile (0.4 hectare) from all Project site boundaries. There are many examples of extensive soil disturbances, most notably the transmission line on the other side of I-15, that have increased noxious weed densities on adjacent BLM lands after construction, even with extensive control efforts.

MM VG-2 includes bonding for the cost of seed collection and storage by an approved botanical garden, on-site monitoring, removal of Sahara mustard, additional bonding, and WEAP training. These measures could reduce some adverse effects on native vegetation and special status species from the spread of

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invasive weeds, but significant, adverse direct and indirect impacts from invasive weeds would still occur from increased disturbance in the area and introduction and expected proliferation of weeds.

Cacti/Yucca. The Proposed Action would have direct, negative impacts on cacti and yucca during construction of the Proposed Action. There would no longer be habitat for the approximately 121,300 cacti and yucca surveyed within the 7,100 acres (2,873 hectares) of the Project site. Cacti and yucca in temporary impact areas for gen-tie line construction would be avoided or transplanted out of the way and then replanted at the site after construction. The cacti and yucca found within the Project site are generally widespread, but they are long-lived, iconic species of the Mojave Desert and provide important habitat for rodents, birds, and reptiles, including juvenile Mojave desert tortoises. Loss of 121,300 cacti and yucca would be significant because even after Project decommissioning, these species would probably not occupy the site again for hundreds of years. Therefore, the Proposed Action would have an adverse impact on cacti and yucca in southern Nevada. Indirect impacts of increased weeds in the surrounding areas would increase the risk of fire, which cacti and yucca are not adapted to and cannot survive. MM VG-1 includes salvaging some percentage of cacti and yucca, which would reduce impacts on the salvaged plants. Loss of cacti and yucca would still occur, and direct impacts to the majority of these plants on the Project site would be adverse.

Biocrust/Desert Pavement. Grading, and disk and roll activities would result in permanent, adverse impacts on biocrust and desert pavement. The Proposed Action would permanently remove all biocrust (approximately 414 acres [168 hectares]) and desert pavement (approximately 524 acres (212 hectares)) within the Project site. Removal of this many acres would likely increase the presence of noxious and non-native weeds in these areas, increase dust (without the 938 acres [380 hectares] of soil stabilization provided by intact biocrusts and desert pavement), and, in the case of biocrust removal, strip the soil of a nutrient-providing resource that would not be available if the site is decommissioned and restored. No actions can mitigate loss of this resource under the Proposed Action. Impacts on these resources would be adverse.

Ephemeral Drainages and Waters of the United States. Direct impacts on waters of the United States, including vegetated and unvegetated ephemeral drainages, could occur primarily from increased sedimentation caused by vegetation removal. There could also be some fill placement in jurisdictional drainages, such as for access road crossings, utility trench crossings, solar panel posts and drainage facilities installation and bank stabilization measures. The ephemeral drainages function would remain intact, even with placement of fill material. Filling and rerouting of drainages on site would be minimized. Berms and channels would be installed along the West Tributary to the California Wash (Figure 3.5-1), totaling approximately 1.2 acres (0.5 hectare) of direct fill. The berms and detention facility would protect the adjacent wash and downstream areas from increased flows, sedimentation, and erosion (see Section 3.5: Water Resources).

Drainages in the Project area do not provide a perennial water source, but sand dispersed by washes provides habitat for threecorner milkvetch. Alteration of flow patterns on and off the Project site from increased overland flows following complete removal of vegetation on the site could change habitat patterns for threecorner milkvetch or change how sand is distributed to remaining populations downstream of the site. If downstream hydrologic flow patterns change, downstream populations would be cut off from other populations and the sand source.

The Applicant would be required to obtain a permit from USACE for the proposed discharge of dredged and/or fill material into waters of the United States under Section 404 of the Clean Water Act. Evaluation

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of a permit application would require the Applicant to provide information demonstrating that adverse effects to the aquatic environment would be avoided and minimized to the maximum extent practicable. For any unavoidable adverse effects, the Applicant would be required to provide sufficient compensatory mitigation to ensure the Proposed Action is not contrary to the public interest and in compliance with the Section 404(b)(1) Guidelines.

Approximately 62 acres (25 hectares) of jurisdictional drainages would be subject to a degree of direct or indirect disturbance (calculated as drainages that overlap with Proposed Action development areas). Placement of fill would be considerably less than 62 acres (25 hectares) and limited only to areas in the final design where jurisdictional drainages cannot be avoided, such as road crossings, per Section 404(b)(1) requirements and MM WR-1 (refer to Section 3.5: Water Resources). Post-construction flows would remain in incised washes. MM WR-1 also requires that solar panels and electrical equipment be elevated above the 100-year flood depth to minimize risk of scour and sediment deposition in ephemeral drainages and waters of the United States. This mitigation measure also requires alteration to the boundary of development area E to avoid the large drainage on the eastern boundary of the site. Avoidance of the drainage in development area E would reduce direct impacts on waters of the United States by 27 acres (11 hectares), which would also considerably reduce direct and indirect hydrologic impacts from flooding, erosion, and sedimentation northeast of the Project site. MM WILD-1 (refer to Section 3.7: Wildlife, Migratory Birds, and Special Status Species) requires that during final design of the Project, all disturbance areas be reduced to the minimum size needed to safely and legally operate the facility. Implementation of this measure would reduce acreage of fill to waters of the United States. The amount of Proposed Action fill has not been calculated but would likely be around 10 acres (4 hectares).

MM GS-1 (refer to Section 3.3: Geology, Soils, and Mineral Resources) requires erosion control and bank stabilization devices to be installed in and around on-site and off-site washes (under appropriate permits). The measure also requires routine site inspections to identify and repair areas of erosion, such as deep rills and gullies, and maintain, change, or add additional erosion control features as needed (in accordance with required permits). Implementation of MM VG-3 would also require implementation of BMPs to avoid drainages alterations to reduce adverse effects. Access roads along the gen-tie lines would need to avoid jurisdictional drainages, per MM WR-1, unless unavoidable, and then only as permitted.

Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during Project facilities installation. Thus, the direct removal of native vegetation communities and special status plants is not anticipated during site decommissioning. Potential direct and indirect effects on native vegetation communities and special status plant populations include introduction of fugitive dust on exposed topsoil and colonization of the Project site by invasive weeds during and after site decommissioning. Vegetation would be slow to recover across the site, even with restoration techniques, especially over such a large area.

With the soil disturbance and compaction from constructing the solar development areas, most of the native seed bank in the soil would not be viable, so adjacent seed sources would be needed for restoration, resulting in an adverse, indirect impact on adjacent vegetation communities where the seeds are sourced. Vegetation communities could take as long as a century to naturally and fully recover to pre-disturbance conditions. Given the number of weeds growing on site and the disturbance proposed, the restoration time may be even longer. The cacti and yucca removed from the site would probably never recolonize this 7,100-acre (2,873-hectare) area. Weed control would be difficult and inhibit restoration efforts. It is

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probable that the sensitive plant communities would not be able to re-establish, especially in the case of Nye milkvetch, where the soils are completely altered.

No impacts are anticipated on waters of the United States during site decommissioning, although 1.2 acres (0.5 hectare) of berms would need to be removed.

Implementation of a Decommissioning Plan would reduce potential adverse effects on vegetation during decommissioning. The Site Restoration Plan would also be implemented during decommissioning and ensure that equipment does not spread invasive weeds; this plan would include restoration and revegetation measures based on BLM's requirements. Other future BMPs would be required. Prior to an NTP, a Site Restoration Plan would be prepared approved. Implementation of this plan would reduce some of the adverse impacts on native vegetation through the restoration of areas to pre-construction conditions; however, it could still take at least a century to return the site to near pre-disturbance conditions. The Site Restoration Plan would include a description of acceptable seed types, seeding techniques, a monitoring and reporting plan, and performance standards, per MM VG-1. The plan would also include measures to address Project site restoration until all success criteria, based on the BLM's restoration template, are met.

Decommissioning would set the Project site on a trajectory to regain some percentage of native perennial species cover. Many species, such as cacti and yucca and the sensitive species in this area, are not expected to ever recolonize the site given the level of disturbance. The annual plant and perennial plant diversity over the Project site would be lost. The site is not expected to ever fully recover to pre-disturbance conditions; the most that can be expected is that some cover of perennial plants is re-established. Overall impacts of the Proposed Action would remain adverse.

Residual Effects

Proposed Action construction would cause permanent loss of creosote-white burrobush shrubland alliance and other native vegetation communities; Nye milkvetch and threecorner milkvetch individuals and habitat would both be directly and indirectly effected by the Project. Adverse effects on biocrust and desert pavement, and cacti and yucca would remain even after mitigation. Jurisdictional drainages would be permanently disturbed. Direct and indirect, adverse impacts related to introduction of non-native and noxious weeds would remain even after implementation of mitigation.

Cumulative Effects

Vegetation, Special Status Plants, Invasive Species, Cacti, and Yucca. Many of the cumulative projects would involve facility grading and construction, resulting in the loss of native vegetation communities, cacti, yucca, and special status plant species in the desert region. BLM estimates that approximately 24,983 acres (10,110 hectares) of threecorner milkvetch habitat existed on BLM lands in southern Nevada and a total of 40,646 acres (16,448 hectares) on all lands. Approximately 11,690 acres (4,731 hectares) of that original habitat have now been developed or are within ROW corridors or disposal areas. Approximately 29 percent of habitat is therefore developed or subject to development. In addition to the impacted threecorner milkvetch population groups, BLM has several applications for ROWs that would permanently disturb habitat in unimpacted population groups. The Proposed Action would increase the habitat loss for threecorner milkvetch to 39 percent of the estimated habitat available, which would be an adverse cumulative impact.

Introduction of weeds from equipment use and vehicles would outcompete native or special status plants and cause cumulative impacts from spread of invasive species. There would be cumulative indirect,

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adverse effects on special status plants from dust and increased spread of weeds from construction of cumulative projects close to the Project, such as #21, TransWest Express Transmission Project. The direct and indirect cumulative effect on native vegetation communities and special status plants would be substantial and adverse from the spread of weeds. Implementation of the Site Restoration Plan and MM AQ-1 would address some adverse direct and indirect effects on native vegetation communities, special status species, cacti, and yucca, such as dust, but would not minimize effects. The Proposed Action would substantially contribute to the regional cumulative effects on native vegetation, the loss of habitat for special status plant species including Nye and threecorner milkvetch, and the regional loss of cacti and yucca.

Biocrust/Desert Pavement. Cumulative projects would involve grading and other ground-disturbing activities, resulting in damage to and loss of desert pavement and biocrust. Cumulative adverse effects on desert pavement and biocrust would occur. The Proposed Action would contribute to a substantial, adverse cumulative effect on desert pavement and biocrust.

Ephemeral Drainages and Waters of the United States. Some of the cumulative projects may involve filling ephemeral drainages or jurisdictional waters, resulting in a substantial, adverse cumulative effect in the desert region. Indirect effects from various impacts to ephemeral drainages and waters of the United States could compound and change hydrologic conditions that could adversely impact sensitive plant species. The Proposed Action would require some fill of jurisdictional drainages, estimated to be approximately 10 acres (4 hectares) and contribute to the adverse cumulative effect due to loss of jurisdictional drainages or changes in flow patterns that could result in flooding. MM WR-1 and MM WILD-1 require minimization of disturbance areas and avoidance of fill placement in jurisdictional drainages, except where unavoidable. MM WR-1 requires that equipment be elevated above the 100-year flood depth. MM GS-1 requires implementation of erosion control and bank stabilization devices, and MM VG-1 requires implementation of BMPs to avoid alterations of drainages, which shall reduce but not eliminating the Project's contribution to the cumulative adverse effect.

All Mowing Alternative

Construction, Operations/Maintenance

Native Vegetation Communities. Under the All Mowing Alternative, the Project site would be constructed using methods that leave the existing vegetation in place. The vegetation would be mowed to a height of 24 inches (61 centimeters) but not less than 18 inches (46 centimeters) throughout the site. Vegetation would need to be crushed to construct the facility; however, passes taken by tracked equipment to construct each solar array would be minimized to reduce the amount of crushed vegetation. An estimated 20 percent of the vegetation is expected to be crushed. Where vegetation is crushed, root balls would be left in place, tracked vehicles would distribute weight and minimize soil disturbance, and turns would be wide to also minimize soil disturbance. Native vegetation is expected to rebound and regrow after construction is complete. Approximately 200 acres (81 hectares) of vegetation would be completely removed to construct roads, the O&M building, substations, and equipment areas. The loss of 200 acres (81 hectares) would be minor as compared with the loss of native vegetation from the Proposed Action. The majority of affected habitat would be creosotebush and white bursage scrub community. Mowing would be needed approximately every 5 or more years. Areas mowed would likely be staggered such that the whole site is not mowed at once. Some vegetation on site is naturally under 24 inches (61 centimeters) in height and would therefore not be altered by mowing. While the vegetation communities would remain in place, it is unknown how mowing would impact the health and vigor of the native vegetation, or how shade from the solar panels would affect long-term growth. Leaving vegetation in

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place would allow wildlife species to use the facility, even though the habitat it provides is modified. MM WILD-1 would also apply to the All Mowing Alternative and requires reduction of the solar facility footprint to only the minimum size needed for Project operation. Impacts would be considerably reduced as compared with the Proposed Action.

Indirect impacts on native vegetation are likely to include some proliferation of existing and new weed species in the development areas from construction workers and equipment travel. Many areas already have high densities of weeds. Internal roads built within the facility would serve as weed vectors. Careful pre-treatment and vehicle cleaning before construction would help to reduce some concerns, per MM VG-1. Crushing approximately 20 percent of the vegetation could also result in some spread of weeds. Leaving native root systems in place would allow the opportunity for native vegetation to rebound instead of weeds. Some off-site spread could also occur. There could be indirect impacts of fugitive dust under this alternative, but it would be considerably less than the Proposed Action because native vegetation would be maintained during Project construction and operation, which would stabilize the soils.

Increases in surface water runoff from the Project site are not anticipated under the All Mowing Alternative, as modeled in Section 3.5: Water Resources. The introduction of contaminants into downstream habitats could result from spills of fuels or other substances such as herbicides. The need for herbicide use under this alternative would be less than with the Proposed Action because the ground would remain covered in native vegetation. MM AQ-1 would require soil stabilization measures to minimize air quality impacts from wind-blown dust. Dust palliatives would not be used on the Project site under the All Mowing Alternative. The Applicant would also be required to implement a WEAP, PUP, SWPPP, Stormwater Quality Monitoring Program, and SPCC Plan. Additional requirements for a Site Restoration Plan and the Integrated Weed Management Plan are provided in MM VG-1, including vegetation monitoring, responsibilities for treating weeds, requirements for pre-clearing of weeds prior to construction (since many areas currently include a high density of weeds, particularly Sahara mustard in sandy soils), treating and eradicating any new weeds discovered on site, monitoring weed vectors (roads), among others. Herbicide use would be limited and only be conducted in accordance with an approved PUP, as described in Chapter 2: Proposed Action and Alternatives. Indirect impacts (such as from spills, herbicide drift, spread of invasive weed species) would be less than with the Proposed Action. Due to the vegetation alteration to construct the facility and ongoing maintenance, effects to native vegetation communities would occur but be considerably less than with the Proposed Action.

Special Status Plants. The All Mowing Alternative would still impact approximately 718 acres (291 hectares) of threecorner milkvetch habitat. Development area D would be smaller than the Proposed Action under this alternative, but the area remaining is threecorner milkvetch habitat. Leaving soils largely intact would allow the species seed bank to remain viable and, therefore, some potential for growth of threecorner milkvetch within the Project site. Vegetation and drainages maintenance may minimize the hydrologic changes that would occur, which could also reduce impacts from changes in sand deposition. The solar arrays, however, may change aeolian processes that create the ideal habitat for this species. The likelihood of threecorner milkvetch growth within the mowed areas is unknown. Although it is unknown if threecorner milkvetch would grow on the Project site during O&M, mitigation measures that require the soils to be left intact would preserve habitat for the threecorner milkvetch such that the plant might eventually be able to recolonize the site.

Indirect impacts from the spread of invasive species would be less than the Proposed Action. Because native vegetation would remain on site, soil disturbance and hydrologic condition changes would be minimized; the off-site and indirect impacts on threecorner milkvetch habitat from edge effects are

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expected to be minimized. The All Mowing Alternative would have an effect on approximately 8 percent of the estimated 8,233 acres (3,332 hectares) in this population group, compared with the approximately 50 percent impact of the population group under the Proposed Action.

Approximately 2 percent of threecorner milkvetch habitat remaining within BLM ownership (habitat not developed and not within a disposal boundary or ROW corridor) would be directly disturbed by the All Mowing Alternative. Accounting for this increase in lost or disturbed habitat, approximately 31 percent (up from 29 percent) of all habitat on BLM land would be lost.

Mitigation would further reduce impacts of the All Mowing Alternative. MM WILD-1 requires minimizing the Project footprint to only that needed for power generation. MM VG-2 includes numerous provisions for threecorner milkvetch habitat, including obtaining a permit for take of plants from the Nevada Division of Forestry for any habitat within the Project site prior to any ground disturbance; collecting seeds prior to ground disturbance; bonding for the cost of seed collection and seed storage by an approved botanical garden; on-site monitoring; removing Sahara mustard; completing herbicide treatment prior to March 15 and only using hand pulling thereafter; no use of aminopyralid in modeled threecorner milkvetch habitat (and Nye milkvetch habitat); additional bonding; and WEAP training. With mitigation, direct impacts on occurrences and habitat of threecorner milkvetch would be less than with the Proposed Action but could still be adverse.

Nye milkvetch could occur primarily in mowed areas but also in some areas of traditional development. Through mowing, Nye milkvetch soils and habitat could be maintained. Under the All Mowing Alternative, indirect impacts would include potential introduction, spread, and proliferation of weeds to adjacent habitat. Herbicide drift and fugitive dust could also impact adjacent populations. Soils and native vegetation would be maintained, and weed spread through active management would be minimized or greatly reduced compared with the Proposed Action. Direct impacts on Nye milkvetch occurrences and habitat would be adverse but less than with the Proposed Action. The seed bank would not be destroyed, and Nye milkvetch may be able to repopulate mowed areas after Project construction. Adverse effects could still occur if the plant does not adapt to modified habitat in the mowed areas, and where roads could remove habitat or result in localized weeds. MM VG-1 would also apply to Nye milkvetch to reduce potential impacts.

Adverse, direct effects on rosy twotone beardtongue are not anticipated, as only two occurrences were identified during botanical surveys and these were located even farther outside of the development areas for this alternative. Populations in adjacent habitats could be affected by fugitive dust, but dust from the All Mowing Alternative would be less than with the Proposed Project and result in minimal impacts.

Invasive Weeds. Construction vehicles accessing the Project site from I-15 could potentially introduce new invasive weeds species to the Project area, similar to the Proposed Action. Vehicles and crews could inadvertently track in clinging seeds and/or parts of invasive weeds, thus facilitating their spread through the Project site. Mowing would maintain existing native vegetation, and pre-treatment for weeds would help to make long-term containment of weeds feasible. Treatment of weed populations would need to comply with stipulations, laws, and regulations. An Integrated Weed Management Plan and PUP would address weed management. These plans would be implemented during both construction and O&M.

MM VG-1 requires that the Site Restoration Plan and Integrated Weed Management Plan include identifying and treating problem weed areas before construction starts; monitoring of problem areas to detect new populations; treating weed populations; and implementing prevention measures, including WEAP training, vehicle and equipment cleaning protocols, and construction reporting. If control

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measures were not conducted or a treatment window was missed, weeds could proliferate along roads or other disturbed areas (such as in areas of crushed vegetation the first few years after Project construction) and weed control costs could increase. Weed species are responsive to seasonality, precipitation, and growing conditions. As a result, various weed species actively germinate year-round, which would require year-round weed maintenance, similar to the Proposed Action. Personnel conducting weed management would need knowledge of Mojave plant communities and weed ecology. MM VG-2 includes bonding for the cost of seed collection and seed storage by an approved botanical garden, on-site monitoring, removal of Sahara mustard, additional bonding, and WEAP training. Given the substantially reduced scale of weed management needed because native vegetation would be maintained on site under this alternative, weed control would be feasible and impacts from spread of invasive species could be minimized.

Cacti/Yucca. Cacti and yucca under 24 inches (61 centimeters) tall in the mowed areas would be left in place and avoided during mowing, thus reducing the number that would require relocation. Larger cacti and yucca would be cut down and allowed to resprout rather than removed and salvaged. Most cacti are expected to resprout if trimmed to less than 18 to 24 inches (46 to 61 centimeters); however, yucca may not survive and shall be salvaged per MM VG-1. Since soils and vegetating would be left in place, yucca could possibly regrow in the future or after decommissioning but would take a long time, potentially many decades or longer. Of the approximately 120,000 or more cacti and yucca that may be encountered, some percentage would be lost, but it would be much less than with the Proposed Action. Loss of cacti and yucca would be adverse, but maintenance of the soils and native vegetation would have less impacts than with the Proposed Action.

Biocrust/Desert Pavement. Mowing would reduce impacts on biocrust and desert pavement compared to the Proposed Action by avoiding direct soil disturbance. Tracked vehicles would distribute weight and reduce churning of soils, including soils containing biocrust. Up to 20 percent of the mowed areas could be driven over, and some unknown amount of biocrust and desert pavement could be damaged. Biocrust and desert pavement on access roads may be removed for road grading, which could impact up to approximately 3 percent of the total biocrust on site. Loss of 3 percent would be adverse, but the remaining biocrust and desert pavement in the solar field would remain intact, offering dust protection and soil nutrients.

Ephemeral Drainages and Waters of the United States. Direct impacts on waters of the United States would be limited under the All Mowing Alternative, as drainages and vegetation would be left in place. Roads and other equipment may result in some changes to drainages, but under this alternative, roads and equipment would cover only 3 percent of the Project site, so changes would likely be minimal. Changes in erosion patterns and sediment flow would be similar to pre-Project conditions (as demonstrated through hydrologic modeling, described in Section 3.5: Water Resources).

Some fill placement in jurisdictional drainages could occur, such as for access road crossings, utility trench crossings, solar panel posts, and installation of erosion control and bank stabilization measures. The function of the ephemeral drainages would remain intact even with some placement of fill material. Existing jurisdictional drainages would not be filled or rerouted on site.

Changes in flow patterns and sand dispersal off site could still occur but would be minimal as compared with the Proposed Action, thus reducing potential off-site impacts to threecorner milkvetch.

The Applicant would be required to obtain a permit from USACE for the proposed discharge of dredged and/or fill material into waters of the United States under Section 404 of the Clean Water Act. Through consultation with the USACE, the impacts under the All Mowing Alternative would likely fall under the

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Nationwide Permit program because of the minimal impacted acreage (estimated at 1 acre [0.4 hectare]). Post-construction flows would remain in incised washes. MM WR-1 also requires that solar panels and electrical equipment are elevated above the 100-year flood depth, which would minimize risk of scour and sediment deposition in ephemeral drainages and waters of the United States. MM WR-1 additionally requires alteration to the boundary of development area E to avoid the large drainage on the eastern boundary of the site. Avoidance of the drainage in development area E would avoid direct impacts to waters of the United States by 27 acres (69 hectares), which would also considerably reduce direct and indirect hydrologic impacts from flooding, erosion, and sedimentation northeast of the Project site (also threecorner milkvetch habitat).

MM WILD-1 requires that during final design of the Project, all disturbance areas be reduced to the minimum size needed to safely and legally operate the facility. Implementation of this measure would reduce acreage of fill to waters of the United States. MM GS-1 requires installation of erosion control and bank stabilization devices in and around on-site and off-site washes (under appropriate permits, noting no berms or channels that could impact desert tortoise would be allowed). MM GS-1 also requires routine site inspections to identify and repair areas of erosion, such as deep rills and gullies and maintain, change, or add additional erosion control features as needed (in accordance with required permits). MM VG-3 also requires implementation of BMPs to avoid altering drainages to reduce adverse effects. Access roads along the gen-tie lines would need to be constructed to avoid jurisdictional drainages, per MM WR-1, unless unavoidable and then only as permitted.

Decommissioning

Decommissioning under the All Mowing Alternative is anticipated to only directly affect areas previously disturbed during Project construction. Decommissioning would result in direct and indirect effects on native vegetation communities and special status plant populations similar to that described for construction for this alternative.

Since vegetation would be maintained on the site throughout the life of Project, recovery after decommissioning would be faster than under the Proposed Action. Native seed banks and soils would be maintained over most of the Project site. Vegetation recovery in the approximately 3 percent of the site where it would be removed may be slower due to loss of seed bank and compaction, but restoration efforts could be focused here. Due to ongoing weed management over the life of the Project, weeds may still be present along road vectors but could be controlled with an intensive Integrated Weed Management Program.

No impacts are anticipated on waters of the United States during site decommissioning.

Implementation of a Decommissioning Plan and Site Restoration Plan would reduce potential adverse effects on vegetation during decommissioning. Implementation of the Site Restoration Plan would ensure that equipment does not spread invasive weeds as it removes equipment and the plan would include restoration and revegetation measures based on BLM's requirements. Other BMPs available in the future would be required. Restoration under the All Mowing Alternative would be achieved much more quickly than under the Proposed Action (in a few years instead of potentially a century). The Site Restoration Plan would include a description of acceptable seed types, seeding techniques, a monitoring and reporting plan, and performance standards, per MM VG-1. The Site Restoration Plan would also include measures to address Project site restoration until all success criteria, based on the BLM's restoration template, are met.

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Residual Effects

Construction of the All Mowing Alternative would cause permanent loss of approximately 200 acres (81 hectares) of creosote-white burrobush shrubland alliance and other native vegetation communities. Some impacts on Nye milkvetch individuals and habitat would occur, but the species seed bank would be maintained within the solar field such that this plant could regrow. The approximately 718 acres (291 hectares) of threecorner milkvetch habitat within the solar development area could be directly impacted. The direct effects are unknown and all acreage under the solar panels could be lost for the Project duration. There would be minimal indirect impacts from dust and spread of invasive species, as active weed treatments would occur and native vegetation and soils maintained. Weed populations should be similar to existing conditions or improved by active treatment that does not currently take place. Some cacti and yucca would be lost over approximately 3 percent of the Project site. Jurisdictional drainages would be subject to permanent disturbance of approximately 1 acre (0.4 hectare) out of approximately 60 acres (24 hectares) on the Project site.

Cumulative Effects

Vegetation, Special Status Plants, Invasive Species, Cacti, and Yucca. Overall effects of cumulative projects with the All Mowing Alternative would be similar to those described for the Proposed Action. Under the All Mowing Alternative, the Project would increase the habitat disturbance for threecorner milkvetch percent to 31 percent (from the current 29 percent loss) of the estimated habitat available, in combination with cumulative projects, which would be an adverse cumulative impact. The soils, however, would remain intact, which has the potential to provide habitat for the plant in the future. Implementation of the Site Restoration Plan and MM AQ-1 and native vegetation maintenance on the Project site under the All Mowing Alternative would reduce the Project's cumulative contribution to overall weed spread in the region compared with the Proposed Action.

The Project would contribute to the regional cumulative effects on native vegetation; the loss of habitat for special status plant species, including Nye and threecorner milkvetch; and the regional loss of cacti and yucca. However, the contribution to these effects would be considerably less than under Proposed Action because native vegetation would be maintained throughout the life of the Project on the solar facility.

Biocrust/Desert Pavement. Cumulative projects would involve grading and other ground-disturbing activities, resulting in damage to and loss of desert pavement and biocrust. The All Mowing could have some effects to biocrust and desert pavement, primarily over approximately 3 percent of the Project site from construction of roads and, potentially, equipment pads and buildings. The contribution to the cumulative loss of this special habitat type from cumulative projects would be adverse but less with the All Mowing Alternative than with the Proposed Action.

Ephemeral Drainages and Waters of the United States. The effects of the All Mowing Alternative in combination with cumulative projects would be the same as described for the Proposed Action. However, the All Mowing Alternative's cumulative contribution to effects would be minimal since only 1 acre (0.4 hectares) would be filled.

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3.6 Vegetation and Jurisdictional Waters

Hybrid Alternative

Construction, Operations/Maintenance

Native Vegetation Communities. *Overview.* The Hybrid Alternative includes constructing approximately 65 percent of the facility using mowing (4,460 acres [1,805 hectares]) and the remaining 35 percent of the facility using disk and roll/traditional methods (2,578 acres [1,043 hectares]).

Mowed Areas. Where mowing would occur, native vegetation communities would be maintained, although some acreage would be removed to construct roads and some equipment areas (such as for battery units). The acreage of vegetation to be permanently removed in mowed areas would be approximately 3 percent or less. The vegetation would be mowed to a height of 24 inches (61 centimeters) but not less than 18 inches (46 centimeters) throughout the mowed areas. Vegetation would need to be crushed to construct the facility; however, passes taken by tracked equipment to construct each solar array would be minimized to reduce the amount of crushed vegetation. An estimated 20 percent of the vegetation is expected to be crushed. Root balls would be left in place, and to minimize soil disturbance, tracked vehicles would distribute weight and turns would be wide.

Native vegetation is expected to rebound and regrow after construction is complete. While the vegetation communities would remain in place in mowed areas, it is unknown how mowing would impact the health and vigor of the native vegetation, or how shade from the solar panels would affect long-term growth. Leaving vegetation in place would allow wildlife species to use the facility even though the habitat it provides is modified.

Indirect impacts on native vegetation are likely to include some degree of proliferation of existing and new weed species in the development areas from construction workers and equipment travel. Careful pre-treatment and cleaning of vehicles prior to construction would help to reduce some concerns. As with the All Mowing Alternative, approximately 20 percent of vegetation crushed for array construction could also result in some spread of weeds. Leaving native root systems in place would allow native vegetation to rebound instead of weeds. Some off-site weed spread could also occur. Fugitive dust indirect impacts could occur under the mowed areas with the Hybrid Alternative, but it would be much less compared to the Proposed Action because native vegetation that stabilizes the soils would be maintained during Project construction and operation.

Impacts and mitigation measures related to Project site surface water runoff, air quality impacts from windblown dust, herbicide use and treatments to control the spread of weeds, and soil stabilization in mowed areas would be the same for this alternative as described above for the All Mowing Alternative. Indirect impacts (such as from spills, herbicide drift, spread of invasive weed species) would be reduced under the Hybrid Alternative compared to the Proposed Action. Due to the alteration of vegetation for Project construction and then ongoing maintenance, effects on native vegetation communities would still occur but be considerably less in mowed areas than with the Proposed Action.

Traditional Development Areas. Areas constructed using traditional development methods would result in the complete removal of vegetation as well as the churning and compaction of soils. Native vegetation would not regrow during Project operation in these areas. Construction of the Hybrid Alternative would cause the direct and permanent loss of 2,578 acres (1,805 hectares) of vegetation and the habitat it provides within the Project site and along the gen-tie lines. The vegetation communities lost would be similar to those described for the Proposed Action (primarily creosote burrobush). These communities provide important habitat for wildlife, from insects to birds to endangered species. The areas that would

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be developed using traditional methods for the Hybrid Alternative correspond to the modeled threecorner milkvetch habitat.

As described for the Proposed Action, the vegetation types on the Project site and the habitat they provide are common in southern Nevada, but they have been disproportionately impacted by ROW actions, OHV events and casual use, wildfires, and invasive species. MM WILD-1 requires that the solar facility footprint be only the minimum size needed for Project operation. However, substantial, permanent loss of habitat would still occur, although this loss would be 65 percent less than with the Proposed Action. The removal of habitat through disk and roll methods, which is considered permanent for the purposes of this analysis, is adverse. There is no way to minimize the direct adverse impacts to native vegetation communities within the 35 percent of the site developed through disk and roll.

Indirect impacts from traditional development of 35 percent of the Project site under the Hybrid Alternative are likely to include the proliferation of existing and new weed species outside of the traditional development areas in adjacent undisturbed areas, including mowed areas of the facility. Spread of weeds would result in a degradation of adjacent vegetation communities. Indirect impacts could also include additional fugitive dust, which can impede photosynthesis and other metabolic processes of native plants or increased or changed sedimentation from Project activities.

Impacts and mitigation measures related to Project site surface water runoff, air quality impacts from windblown dust, herbicide use and treatments to control the spread of weeds, and soil stabilization in traditional development areas would be the same for this alternative as described above for the Proposed Action. Indirect impacts (such as from spills, herbicide drift, spread of invasive weed species) could be reduced and sometimes minimized but would not be eliminated, even with mitigation. Over a 30-year minimum period, these indirect impacts are expected to extend at least within the 1-mile (0.4-hectare) impact buffer of the areas developed using traditional methods.

Special Status Plants. *Overview.* The two special status plant species that could be impacted under the Hybrid Alternative are the same as with the Proposed Action: threecorner and Nye milkvetch. Rosy two-toned beardtongue is located outside the development areas. Indirect impacts could occur to this species from dust and weeds, as described for the Proposed Action.

Mowed Areas. Nye milkvetch could occur primarily in mowed areas but also in some areas of traditional development. Through mowing, Nye milkvetch soils and habitat could be maintained. Indirect impacts would include potential introduction, spread, and proliferation of weeds. Herbicide drift and fugitive dust could also impact adjacent populations but would be minimized in mowed areas due to the maintenance of native vegetation. Through mowing and other mitigation, spread can be reduced to less than that for the Proposed Action.

Under the Hybrid Alternative, soils and native vegetation would be maintained, and weed spread through active management would be minimized as compared with the Proposed Action. Direct impacts on Nye milkvetch occurrences and habitat would be adverse but less under the Hybrid than under the Proposed Action. The seed bank would not be destroyed, and Nye milkvetch may be able to repopulate mowed areas after Project construction. Adverse effects could still occur if the plant does not adapt to modified habitat in the mowed areas and where roads could remove habitat or result in localized weeds. MM VG-1 would also apply to Nye milkvetch to reduce potential impacts.

Traditional Development Areas. Based on a 2011 model (Hamilton and Kokos 2011), the Hybrid Alternative would directly impact approximately 718 acres (291 hectares) of threecorner milkvetch

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habitat, the same as with the Proposed Action,. The areas of traditional development under this alternative correspond to the threecorner milkvetch habitat on the Project site. The Project would directly impact 13 percent of the habitat of this population group within BLM management (some of the population group in this area occurs on adjacent tribal land) (Southwest Ecology LLC 2018). This level of impact is not consistent with BLM's commitment under the MSHCP to have no net loss of habitat for this species.

Indirect impacts are assumed to occur within a mile-wide (0.4-hectare-wide) buffer of the traditional development areas under the Hybrid Alternative. Adverse, indirect impacts on threecorner milkvetch would occur from the proliferation of non-native weeds and introduction of new non-native weeds, herbicide use due to drift, and alteration of wash flows and potential loss of suitable habitat for population expansion. Given the buffer of the traditional development areas, a similar acreage of habitat to the Proposed Action would be impacted. Edge effects from disturbance and untreated weeds within disturbed areas would result in the proliferation of noxious and non-native weeds from the Project area to adjacent BLM lands. Downstream impacts related to changes in ephemeral drainages, which provide the sandy soils the threecorner milkvetch requires, could impact an even larger proportion of this population group, similar to the Proposed Action.

The combined direct and indirect disturbance associated with the Hybrid Alternative accounts for a loss of or disturbance to 25 percent of threecorner milkvetch habitat remaining within BLM ownership (habitat not developed and not within a disposal boundary or ROW corridor). Accounting for this increase in lost or disturbed habitat, approximately 39 percent of all habitat on BLM land would be lost, up from the estimate of existing disturbance to threecorner milkvetch original habitat of 29 percent.

MM WILD-1 requires minimizing the Project footprint to only the area needed for power generation, thus potentially reducing some direct impact acreage but not likely changing indirect effects. MM VG-2 includes numerous provisions for threecorner milkvetch habitat, including obtaining a permit for take of plants from the Nevada Division of Forestry for any habitat within the Project site prior to any ground disturbance; collecting seeds prior to ground disturbance; bonding for the cost of seed collection and seed storage by an approved botanical garden; prohibiting disk and roll in development areas C, D, and E (only drive and crush would be allowed); on-site monitoring; removing Sahara mustard; completing herbicide treatment prior to March 15; and only using hand-pulling thereafter, no use of aminopyralid in modeled threecorner milkvetch habitat (and Nye milkvetch habitat), additional bonding, and WEAP training.

The use of drive and crush instead of disk and roll per MM VG-2 could reduce the potential for loss of habitat as well as off-site impacts. If soils and root systems are maintained in threecorner milkvetch habitat areas, native vegetation could regrow and thus reduce the potential for weed propagation. Soils and seed banks would not be destroyed with use of drive and crush, compared with disk and roll methods. With intensive treatment under an Integrated Weed Management Plan and PUP, invasive weeds and the indirect impacts of weed spread up to 1 mile (0.4 hectare) off the site would be reduced. This mitigation for drive and crush would be much more effective under the Hybrid Alternative than if it were applied to the Proposed Action since the other 65 percent of the Project site would be mowed under this alternative. Weed proliferation, dust, and invasive species spread would be reduced in mowed areas. Indirect impacts on threecorner milkvetch could be reduced under this alternative with the application of drive and crush in areas where traditional methods would have been used per MM VG-2. Although it is unknown if threecorner milkvetch would grow on the Project site during O&M, mitigation measures that require the soils to be left intact will preserve habitat for the threecorner milkvetch such that the plant might eventually be able to recolonize the site. MM VG-2 would also reduce impacts to any Nye milkvetch occurring within development areas C, D, and E.

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Invasive Weeds. *Overview.* Construction vehicles accessing the site from I-15 could potentially introduce new species of invasive weeds to the Project area, similar to the Proposed Action. Vehicles and crews could inadvertently track in clinging seeds and/or parts of invasive weeds, thus facilitating their spread through the Project site.

Mowed Areas. Mowing over 65 percent of the site would maintain existing native vegetation and pre-treatment for weeds per MM VG-1 would help to make long-term containment of weeds feasible in the mowed areas. Proximity of the mowed areas to the traditional development areas, however, would make treating weeds more difficult than under the All Mowing Alternative. Treatment of weed populations would need to comply with stipulations, laws, and regulations.

Traditional Development Areas. The disk and roll methods of construction uproot all existing vegetation and soils and compact them into a flat surface. Because weeds are already common in the traditional development areas, particularly Sahara mustard, the soil disturbance proposed would result in 35 percent of the site becoming suitable habitat only for the existing, and potentially newly introduced, weed species. With anticipated increased weed abundances from the Project disturbance, the density of weeds throughout the traditional development areas could potentially triple, based on lessons learned on other large-scale soil-disturbing projects. Invasive weeds would spread from the traditional development areas into surrounding federal land and onto the mowed areas, making weed control more difficult in those areas.

Invasive weeds would have adverse impacts by disrupting native plant communities, creating fire hazards, reducing biodiversity, and outcompeting and threatening special status species, as previously discussed for the Proposed Action. The amount of herbicide needed to control the weeds that would occupy the traditional development areas after construction could kill the remaining native seed banks in the soil that survived construction disturbance. The BLM also does not have funding to adequately address existing weed issues, and therefore, would not have funding to address increased weed densities caused by the disturbance over 35 percent of the site for the Hybrid Alternative. The increases in weeds are likely to affect sensitive plant habitat.

An Integrated Weed Management Plan and PUP would address weed management. These plans would be implemented during both construction and O&M of the Project. MM VG-1 requires that the Site Restoration Plan and Integrated Weed Management Plan include identifying and treating problem weed areas before starting construction; monitoring of problem areas to detect new populations; treating weed populations; and implementing prevention measures, including WEAP training, vehicle and equipment cleaning protocols, and construction reporting. If control measures were not conducted or a treatment window was missed, weeds could proliferate and weed control costs could quickly become prohibitive.

Even if weeds are managed, there is still a high likelihood that edge effects from the traditional development areas of the Project would increase noxious and non-native weeds in the surrounding areas. The area of off-site effect is approximately 1 mile (0.4 hectare) from the areas of traditional development. There are many examples of extensive soil disturbances, most notably the transmission line on the other side of I-15, that have increased noxious weed densities on adjacent BLM lands after construction, even with extensive control efforts.

In addition to the Integrated Weed Management Plan and the PUP, MM VG-2 includes bonding for the cost of seed collection and seed storage by an approved botanical garden; prohibiting disk and roll in development areas C, D, and E (only drive and crush would be allowed); on-site monitoring; removing Sahara mustard; additional bonding; and WEAP training. The use of drive and crush instead of disk and

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roll per MM VG-2 would reduce the potential for loss of habitat as well as off-site impacts for the Hybrid Alternative. If soils and root systems are maintained, native vegetation could regrow and thus reduce the potential for weed propagation. Compared with disk and roll methods, soils and seed banks would not be destroyed with use of drive and crush. With intensive treatment under an Integrated Weed Management Plan, invasive weeds and the indirect impacts of weed spread off site would be reduced if only drive and crush methods are used. This mitigation for drive and crush would be much more effective under the Hybrid Alternative than the Proposed Action since the other 65 percent of the Project site would be mowed, as previously stated. Weed proliferation, dust, and invasive species spread would be reduced in mowed areas. These measures could reduce some adverse effects on native vegetation and special status species from the spread of invasive weeds. Adverse direct and indirect impacts from invasive weeds would still occur from increased disturbance in the area and introduction and the expected proliferation of weeds.

Cacti/Yucca. Under the Hybrid Alternative, cacti and yucca in the mowed areas that are under 24 inches (61 centimeters) tall would be left in place and avoided on the 65 percent of the site constructed using mowing, thus reducing the number of cacti and yucca that would require relocation compared with the Proposed Action. Larger cacti and yucca would be cut and allowed to resprout rather than be removed and salvaged. Most cacti are expected to resprout if trimmed to less than 18 to 24 inches (46 to 61 centimeters); however, yucca may not survive and would be salvaged per MM VG-1. Because soils and vegetation would be left in place, yucca could possibly regrow in the future or after restoration, but this would take a long time—potentially many decades or longer. Yucca and cacti in areas of traditional development would be removed as would their habitat from disk and roll. MM VG-2 requires drive and crush be used instead of disk and roll in the traditional development areas, which would reduce some impacts by keeping soils and seed banks intact. Loss of cacti and yucca would be adverse, but soils and native vegetation maintenance would reduce impacts as compared with the Proposed Action.

Biocrust/Desert Pavement. Mowing would reduce impacts on biocrust and desert pavement by avoiding direct disturbance to the soil. Tracked vehicles would be used to distribute weight and reduce churning of soils, including soils containing biocrust. Up to 20 percent of the mowed areas could be driven over and some unknown amount of biocrust and desert pavement could be damaged. Biocrust and desert pavement on access roads may be removed for grading of the roads and could impact up to approximately 3 percent of the total biocrust on-site in mowed areas. Loss of this biocrust in mowed areas would still be adverse, but the remaining biocrust and desert pavement in the mowed solar field would remain intact, thus offering dust protection and soil nutrients.

Approximately 117 acres (47 hectares) of biocrust and 142 acres (57 hectares) of desert pavement would be lost in the traditional development areas. Impacts from loss of desert pavement would adversely affect habitat from dust and loss of nutrients needed for restoration. MM VG-2, which requires the use of drive and crush instead of disk and roll in the traditional development areas would reduce impacts.

Ephemeral Drainages and Waters of the United States. Direct impacts on waters of the United States, would be reduced under the Hybrid Alternative, since drainages would be left in place as well as vegetation over 65 percent of the Project site. Roads and other equipment may result in some changes to drainages, but under this alternative, roads and equipment cover 3 percent of the mowed areas, so changes are anticipated to be minimal. Changes in erosion patterns and sediment flow is anticipated to be similar to pre-Project conditions in mowed areas (as demonstrated through hydrologic modeling, described in Section 3.5: Water Resources).

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3.6 Vegetation and Jurisdictional Waters

Some placement of fill in jurisdictional drainages could occur, such as for access road crossings, utility trench crossings, solar panel posts, and installation of erosion control and bank stabilization measures. The function of the ephemeral drainages would remain intact even with some placement of fill material for these purposes. Existing jurisdictional drainages would not be filled or rerouted on-site.

Changes in flow patterns and sand dispersal off site could still occur for traditional development areas, which correspond to threecorner milkvetch habitat. Indirect impacts to threecorner milkvetch habitat would be similar to the Proposed Action for traditional development areas.

The Applicant would be required to obtain a permit from USACE for the proposed discharge of dredged and/or fill material into waters of the United States under Section 404 of the Clean Water Act. Through consultation with the USACE, the impacts under the Hybrid Alternative would likely fall under the Nationwide Permit program, due to the minimal acreage impacted (estimated at 1 acre [0.4 hectare]).

Flows would remain in existing washes, similar to pre-construction conditions, although greater overland flow in traditional development areas could change drainage patterns. MM VG-2 requires that only drive and crush is used in traditional development areas under the Hybrid Alternative. The regrowth of native vegetation and the reduced disturbance of soils would reduce hydrologic and downstream impacts but may not completely avoid them. Changes in sand and sediment deposition and flow patterns could still occur, particularly in the first few years before the crushed vegetation grows back but would be reduced as compared with the Proposed Action.

MM WR-1 requires that solar panels and electrical equipment are elevated above the 100- year flood depth, minimizing risk of scour and sediment deposition in ephemeral drainages and waters of the United States. The mitigation measure additionally requires alteration to the boundary of development area E to avoid the large drainage on the eastern boundary of the site. Avoidance of the drainage in development area E would avoid direct impacts to waters of the United States by 27 acres (69 hectares), which would also considerably reduce direct and indirect hydrologic impacts from flooding, erosion, and sedimentation to the northeast of the Project site, which is also threecorner milkvetch habitat. MM WILD-1 requires that during final design of the Project, all disturbance areas be reduced to the minimum size needed to safely and legally operate the facility. Implementation of this measure would reduce acreage of fill to waters of the United States. MM GS-1 requires erosion control and bank stabilization devices to be installed in and around on-site and off-site washes (under appropriate permits, noting no berms or channels that could impact desert tortoise would be allowed). The measure also requires routine site inspections to identify and repair areas of erosion, such as deep rills and gullies and maintain, change, or add additional erosion control features as needed (in accordance with required permits). Implementation of MM VG-3 would also require implementation of BMPs to avoid alterations of drainages to reduce adverse effects. Access roads along the gen-tie lines would need to be constructed to avoid jurisdictional drainages, per MM WR-1, unless unavoidable and then only as permitted.

Decommissioning

Direct and indirect effects of the Hybrid Alternative during Project decommissioning would be the same as described for the All Mowing Alternative in the mowed areas. However, weed management may not be as effective with this alternative because mowed areas would be adjacent to cleared areas. Implementation of MM VG-2, which requires only drive and crush construction methods in traditional development areas, could reduce effects in traditional development areas, reducing weeds and maintaining native vegetation and seed banks during the life of the Project.

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The Site Restoration Plan would include a description of acceptable seed types, seeding techniques, a monitoring and reporting plan, and performance standards, per MM VG-1. The Site Restoration Plan would include measures to address restoration of the Project site until all success criteria, based on the BLM's restoration template, have been met. Traditional development areas under this alternative would have similar restoration effects as the Proposed Action. The 2,578 acres (1,043 hectares) developed using traditional methods could take over 100 years to restore. Implementation of MM VG-2 using drive and crush instead of disk and roll in all traditional development areas under this alternative would allow for faster restoration, similar to the All Mowing Alternative.

Residual Effects

Construction of the Hybrid Alternative would cause permanent loss of approximately 2,378 acres (1,043 hectares) of creosote-white burrobush shrubland alliance, and other native vegetation communities; however, implementation of MM VG-2 that requires this acreage to be developed using drive and crush instead of disk and roll would reduce some of these impacts. Native vegetation would be crushed but would be able to regrow. Some impacts to Nye milkvetch individuals and habitat would occur, but the species seed bank would be maintained within the solar field such that the plants could regrow.

Approximately 718 acres (290 hectares) of threecorner milkvetch habitat within the solar development area could be directly impacted. The direct effects are unknown, but all acreage under the solar panels could be lost for the life of the Project. There would be indirect impacts from dust and spread of invasive species; however, these impacts would be lessened using drive and crush instead of disk and roll during Project construction. Also, indirect impacts would be less than with the Proposed Action. Loss of cacti and yucca would occur over 35 percent of the Project site. Approximately 117 acres (47 hectares) of biocrust and 142 acres (57 hectares) of desert pavement would be lost in the traditional development areas, although this amount would be reduced by MM VG-2 that requires drive and crush instead of disk and roll.

Cumulative Effects

Vegetation, Special Status Plants, Invasive Species, Cacti, and Yucca. The description of cumulative projects' effects on the percentage of acreage loss of native vegetation communities, cacti, yucca, and special status plant species and their habitat in the desert region is the same as presented above for the Project Action. The Hybrid Alternative would increase the direct habitat loss for threecorner milkvetch to approximately 39 percent of the estimated habitat available (up from the existing habitat loss of 29 percent), which would be an adverse cumulative impact. With implementation of MM VG-2, which requires use of drive and crush instead of disk and roll in traditional development areas, indirect effects would occur under this alternative but would be less than under the Proposed Action

The introduction and spread of weeds with the Hybrid Alternative would be similar to the effects described for the Proposed Action (although somewhat reduced due to mowing of 65 percent of the site). MM VG-2 and MM AQ-1 under this alternative would reduce the Project's cumulative contribution to overall weed spread in the region compared to the Proposed Action, but cumulative impacts would still occur.

The Project would contribute to the regional cumulative effects on native vegetation, the loss of habitat for special status plant species including Nye and threecorner milkvetch, and the regional loss of cacti and yucca, but the contribution would be less than that of the Proposed Action.

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Biocrust/Desert Pavement. Cumulative projects would involve grading and other ground-disturbing activities, resulting in damage to and loss of desert pavement and biocrust. The Hybrid Alternative would have reduced impacts than the Proposed Action on biocrust and desert pavement with the requirement to use drive and crush instead of disk and roll in the traditional development areas. Some biocrust and desert pavement would be lost, which would contribute to regionally significant cumulative effects.

Ephemeral Drainages and Waters of the United States. Cumulative effects of the Hybrid Alternative would be the same as described for the Proposed Action, except the Hybrid Alternative contribution to cumulative impacts for placement of fill would be placed on approximately 1 acre (0.4 hectare) of jurisdictional drainages, which is just a tenth of what would be filled under the Proposed Action.

No Action Alternative

Under the No Action Alternative, the Project would not be built and none of the impacts described herein on vegetation resources and jurisdictional waters would occur.

Mitigation Measures

- MM GS-1: Operation and Maintenance Erosion Control (from Section 3.3 Geology, Soils, and Mineral Resources)
- MM WR-1: Elevation of Solar Facilities in Floodplain Areas, Avoidance of Jurisdictional Drainages (from Section 3.5: Water Resources)
- MM VG-1: Requirements of the Site Restoration Plan and Integrated Weed Management Plan (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM VG-2: Threecorner Milkvetch and Other Special Status Plants (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM VG-3: Drainage Protection (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM WILD-1: Reduced Project Footprint (from Section 3.7 Wildlife, Migratory Birds, and Special Status Species)
- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

3.7 Wildlife, Migratory Birds, and Special Status Species

3.7.1 Affected Environment

Introduction

This section provides a summary of the wildlife resources that are known to occur or could occur in the Project area and that could be affected by Project construction, O&M, and decommissioning. Detailed descriptions of the wildlife surveys conducted for the Project and their findings are found in the *Desert Tortoise Survey Report (Areas A-E)* (Phoenix Biological Consulting 2018b); *Desert Tortoise Survey Report (Areas B1, B2, F&G)* (Phoenix Biological Consulting 2018c); and the *Golden Eagle (Aquila chrysaetos) Survey Report* (Dugan Biological Services, LLC and Phoenix Biological Consulting 2019).

The BLM manages general wildlife habitat and special status species according to the following regulations, policies, and plans: the 1998 Las Vegas RMP, as amended (BLM 1998); BLM Manual 6500 – Fish and Wildlife Conservation; BLM Manual 6720 – Aquatic Resource Management; and BLM Manual 6840 – Special Status Species Management. Wildlife conservation in the state of Nevada is guided by the *Nevada Wildlife Action Plan* (Nevada Department of Wildlife 2013), and protection is

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3.7 Wildlife, Migratory Birds, and Special Status Species

provided under NRS 501.110. Migratory birds are protected under the following regulations and laws: Migratory Bird Treaty Act of 1918, as amended; the Fish and Wildlife Conservation Act of 1980, as amended; the Bald and Eagle Protection Act; and Executive Order 13186. Additional information on laws and regulations pertaining to wildlife, migratory birds, and special status species are provided in Appendix E.

Data Sources and Methodology

General wildlife observations were included in the desert tortoise surveys conducted for the Project (refer to Section 3.8: Threatened, Endangered, and Candidate Species). Visual surveys were conducted by helicopter for suitable eagle nesting habitat within the survey area on December 18 and 19, 2017. A ground occupancy survey for eagles was performed on February 21 and 22, 2018. Additional ground surveys were conducted on May 3, 2018 and July 7 and 8, 2018, respectively. Avian point count surveys were conducted in October and December 2017 and May 2018. The data and methods of these studies are documented in the *Golden Eagle (Aquila chrysaetos) Survey Report* (Dugan Biological Services, LLC and Phoenix Biological Consulting 2019).

Analysis Area

The analysis area (also referred to as the study area in this section) where direct effects on wildlife, migratory birds, and special status species could occur is primarily the Project site. The analysis area for golden eagle (*Aquila chrysaetos*) is up to 10 miles (16 kilometers) around the Project site, per USFWS recommendations.

Affected Environment

General Wildlife

Desert ecosystems typically exhibit a low diversity of wildlife species relative to mountain or forest ecosystems. Wildlife species in the area of direct and indirect effects include mammals, reptiles, and birds. General vertebrate species that were observed during surveys are shown in Exhibit 11 of the *Desert Tortoise Survey Report (Areas A-E)* (Phoenix Biological Consulting 2018b), and primarily include American badger (*Taxidea taxus*), burrowing owl (*Athene cunicularia*), and desert kit fox (*Vulpes macrotis arsipus*).

Desert bighorn sheep (*Ovis canadensis nelsoni*) may pass through the Project area. Bighorn sheep were observed during the golden eagle surveys, but were outside of the Project area. Known populations are present in the Muddy Mountains (approximately 2.5 miles [4 kilometers] away) and the Arrow Canyon Range (approximately 5 miles [8 kilometers] away) (Dellen 2017).

Migratory Birds

The USFWS defines a migratory bird as any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. Almost all birds found in the Project area are considered migratory birds.

A total of 61 avian species were observed during the baseline surveys, including the following 10 special status species: American avocet (*Recurvirostra americana*), golden eagle, Swainson's hawk (*Buteo swainsoni*), prairie falcon (*Falco mexicanus*), burrowing owl, loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*), LeConte's thrasher (*Toxostoma lecontei*), Brewer's sparrow (*Spizella breweri*), and Bell's/sagebrush sparrow (*Amphispiza belli*). Of the 61 species found, many were identified during migration and would not be expected to occur on the Project site during the breeding

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season. Six species were observed nesting in the study area, including two special status species: loggerhead shrike and LeConte's thrasher. The other four species observed nesting in the study area were mourning dove (*Zenaida macroura*), verdin (*Auriparus flaviceps*), cactus wren (*Campylorhynchus brunneicapillus*), and northern mockingbird (*Mimus polyglottos*). Ten additional species have some potential to nest in the Project area. These species included four special status species: burrowing owl, Bendire's thrasher (*Toxostoma bendirei*), crissal thrasher (*Toxostoma crissale*), and phainopepla (*Phainopepla nitens*). Other avian species encountered included red-tailed hawk (*Buteo jamaicensis*), lesser nighthawk (*Chordeiles acutipennis*), Costa's hummingbird (*Calypte costae*), Say's phoebe (*Sayornis saya*), common raven (*Corvus corax*), horned lark (*Eremophila alpestris*), rock wren (*Salpinctes obsoletus*), black-tailed gnatcatcher (*Polioptila melanura*), and black-throated sparrow (*Amphispiza bilineata*).

Thirteen golden eagle nests were observed during the occupancy surveys (refer to Figure 3.7-1 and Figure 3.7-2) (Dugan Biological Services, LLC and Phoenix Biological Consulting 2019). Two golden eagle nests were found within 1 to 3 miles (2 to 5 kilometers), eight nests within 3 to 6 miles (5 to 10 kilometers), and three nests within 6 to 10 miles (10 to 16 kilometers) of the Project area. All eagle nests were observed in steep, mountainous, rocky habitats. An adult pair of golden eagles was observed engaged in aerial courtship. The golden eagle surveys focused on determining the productivity at the 13 nests. Aerial surveys confirmed two occupied, four active, and seven inactive golden eagle nests within the 10-mile (16-kilometer) survey area. The closest occupied nest contained a single chick estimated to be 22 to 25 days old. The chick was accompanied in the nest by an adult eagle. The ground survey confirmed the chick successfully fledged the nest. This nest was approximately 2 miles (3 kilometers) from the Project area. The other occupied golden eagle nest was determined to be active based on the presence and behavior of an adult eagle pair at the nest, in addition to the observation of a freshly killed and partially eaten black-tailed jackrabbit on a perch adjacent to the nest. This nest was 6 miles (10 kilometers) from the Project area (Dugan Biological Services, LLC and Phoenix Biological Consulting 2019). Refer to Figure 3.7-3 for a map of the complete flight tracks for the Phase 1 and Phase 2 golden eagle nest surveys.

Bats

Focused bat surveys have not been conducted in the study area. Fifteen special status bat species were identified during the literature review as having some likelihood to occur in the study area. The study area could be used by all of these special status bats and other common bats for foraging. Little to no suitable roosting habitat for bats is found in the study area. No mines, rocky outcrops, trees, or buildings are located in the study area. Some medium-sized caliche caves are present along the upper reaches of California Wash (in the southern portions of the Project site), but the lack of a perennial water source would likely preclude their use for roosting.

3.7.2 Environmental Consequences

Proposed Action

Wildlife

Construction and Operation/Maintenance. Construction and O&M of the Proposed Action would result in impacts on native desert creosote bush scrub vegetation that provides suitable habitat for numerous wildlife species. The Proposed Action would result in 7,097 acres (2,872 hectares) of permanent ground disturbance and 53 acres (21 hectares) of temporary ground disturbance during construction of the Project.

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Direct effects, such as injury or mortality, on general and special status, non-listed wildlife species may occur from contact with Project facilities and equipment. Direct effects could also occur from disturbance and removal of vegetation communities that provide suitable habitat for such species. The use of herbicides (used properly or improperly) could also adversely affect general and special status wildlife species. Possible direct effects from herbicides from contact with or ingestion of treated materials could result in death, damage to vital organs, decrease in body weight, decrease in healthy offspring, and increased susceptibility to predation, depending on exposure time and amount.

Direct effects on wildlife species could occur from habitat disturbance and direct injury or mortality to individuals from contact with construction equipment and/or Project facilities and equipment. The Proposed Action would permanently affect a total of 7,097 acres (2,872 hectares) of suitable habitat for species, which is approximately 20 percent of the approximately 37,000 acres (14,973 hectares) of available creosote bush desert scrub habitat in the ROW application area. Additional creosote bush desert scrub habitat is available on BLM land surrounding the Project site, and tens of thousands of additional acres are available to the north of the Project site on the Moapa River Indian Reservation. Approximately 20 million additional acres (8 million hectares) are available within the larger Mojave ecoregion (BLM 2014a), which contains similar habitat. The effect of the Project on this habitat type would be locally significant due to the size of the site but regionally minor. Impacts on general wildlife would be further reduced through implementation of several mitigation measures. MM WILD-1 requires disturbance areas to be refined and designed to the minimum size needed to safely and legally operate the facility, including access roads, prior to issuance of an NTP for construction.

Water ponds on the construction site could also present a danger to wildlife species. If these ponds were lined with a smooth material, wildlife entering them might not be able to escape and could drown. MMs WILD-2 through WILD-5 would be implemented to protect wildlife during project construction and operation. To prevent injury to wildlife, the ponds would be fitted with exclusion devices and/or textured material on the bottom and sides of the ponds to allow animals to escape, per MM WILD-6.

Potentially suitable foraging habitat for bat species is present in the Project area, but the habitat is not expected to be of high quality due to the lack of permanent water. No roosting habitat occurs on the Project site because there are no caves, mines, cliffs, bridges, structures, or trees near a perennial water source to provide opportunities for foraging. Little to no available data exist regarding bat mortalities from collision with PV solar panels. While the potential impact on bats is expected to be minimal, ongoing monitoring efforts for the Project (which will be described in the BLM-required Bird BBCS) and other proposed solar projects in the region, would address effects on bats from solar development.

The area of indirect effects is approximately a 5-mile (8-kilometer) radius around the Project site. Potential indirect effects on wildlife from both construction and operation could occur from surface water and sediment runoff from the solar facility (which, under the Proposed Action, would not have any native vegetation cover), in addition to dust generated by Project activities, noise, lighting, spread of invasive species, use of herbicides, accidental spills, habitat fragmentation, loss of foraging habitat, and harassment. Potential indirect effects are expected to be negligible with implementation of Project design features that would control and minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project. The Applicant would implement a WEAP, Site Restoration Plan, Integrated Weed Management Plan, PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan. Additional requirements for the Site Restoration Plan and the Integrated Weed Management Plan are provided in MM VG-1 (refer to Section 3.6: Vegetation and Jurisdictional Waters). The measure requires that the Site Restoration Plan

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address weed identification, removal, and herbicide use in a PUP, in addition to restoration. Herbicide use would only be conducted in accordance with an approved PUP, as described in Chapter 2: Proposed Action and Alternatives. With implementation of these various plans and mitigations, indirect effects on general wildlife are not anticipated to be adverse.

The fencing around the Project could block the free movement of any wildlife that cannot fit through or under the fence. Since smaller wildlife are common and abundant, effects would not be adverse. Impacts on the movements of large game species would be minimal since such species rarely use the Project site.

The Project is not located in close enough proximity to any ACECs to generate indirect effects, such as could occur from noise, in areas designated for special status species. The closest ACEC is Hidden Valley ACEC, located 3.3 miles (5.3 kilometers) to the southeast in the Muddy Mountains.

Decommissioning. Decommissioning could result in short-term negative effects on individual wildlife and habitats within and adjacent to the Project site. Potential negative impacts from the loss of habitat during the operation of the solar facility would be reduced as reclamation proceeds. Reclamation would be a long and likely slow process, but would follow a Decommissioning Plan and a Site Restoration Plan. It would take several decades or longer before the site becomes functioning habitat again.

Migratory Birds

Construction and Operation/Maintenance. Migratory birds, including special status species and other protected species, are known to nest in the Project area and on the Project site. Golden eagles are known to nest in the mountains from 2 to 10 miles [3 to 16 kilometers] from the Project site. Other migratory birds are known to nest in the on-site vegetation. Direct effects on migratory birds during Project construction and operation could occur from habitat disturbance and loss. Nesting habitat would be lost for avian species that use desert creosote bush scrub habitat, several of which were identified in the discussion of the affected environment. Approximately 20 million acres (8 million hectares) of habitat is available within the larger Mojave ecoregion (BLM 2014a), including the mountain ranges directly north and south of the Project site. Construction and development of the solar facility and gen-tie lines would result in the loss of approximately 7,097 acres (2,872 hectares) of habitat; the impact would be locally significant due to the size of the site but regionally minor.

Construction activities could result in the direct injury or death of nesting birds and their eggs. MM WILD-8 requires avoidance of habitat-altering activities during bird breeding season, to the extent possible, which generally occurs from February 15 through August 3. If a Project-related activity must occur during the breeding season, a qualified biologist would survey the area for nests immediately prior to commencement of construction activities. The surveys would include burrowing and ground-nesting species in addition to those nesting in vegetation. If any active nests are found, an appropriately-sized buffer area would be established in coordination with the BLM and maintained until the young birds fledge. This buffer would be required to connect to other suitable, undisturbed habitat. The above dates are a general guideline, and any active nests observed outside of this range would also be avoided.

Other direct effects could occur from bird collisions with construction equipment, transmission lines, facility lighting, and solar panels. Since birds are highly mobile, they would most likely move out of harm's way during construction. The 11.2 miles (18.0 kilometers) of overhead 230 kV and 500 kV gen-tie lines connecting to the Crystal Substation could increase the risk of electrocution for birds flying through the Project area, which would be an adverse effect. Implementation of APLIC measures and the BBCS would reduce the risk of collision and electrocution. Birds are also known to collide with lighted

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structures. Any lighting on Project facilities and associated infrastructure would be down-shielded to keep light within the boundaries of the site and would be limited to the minimum amount and intensity needed. If pole or tower lighting is required, only pulsating lights would be used at night, and such lighting would follow FAA guidelines regarding the minimum number, intensity, and number of flashes per minute. Solid red or white lights would not be used, as they are known to attract birds. The Applicant would prepare a Lighting Plan for BLM approval. Birds could also collide with solar panels resulting in injury or death. These types of collisions have been documented at other solar facilities in the desert. The BBCS would include a robust systematic monitoring and adaptive management plan for the Project to assist in avoiding and minimizing impacts on migratory birds, per MM WILD-7. The monitoring would include overall annual mortality, species composition, and spatial differentiation based on established searcher efficiency and carcass persistence trials at the site. Monitoring plans would be designed to account for seasonal differences and fatality events of rare species. Implementation of MMs WILD-2 through WILD-5 would further minimize adverse effects. Construction would require the temporary development of up to four, 1-acre (0.4-hectare) ponds to store construction water. Migratory birds may be attracted to the water. The ponds would not contain any chemicals that are not approved in the PUP, which would address any potential for harm to wildlife, including migratory birds. To prevent injury to birds, the ponds would be fitted with exclusion devices that could include floating balls, fencing, or covering (non-netted) to minimize use by birds, per MM WILD-6.

Indirect impacts on migratory birds could result from surface water and sediment runoff from disturbed areas, dust generated by Project activities, noise, lighting, spread of invasive species, use of herbicides, accidental spills, harassment, territory abandonment, increased opportunity for predators, habitat fragmentation, avoidance due to increased human presence, and altered hydrology. Any migratory birds present near heavy equipment use may temporarily be disturbed or displaced by noise. Indirect effects on areas outside the Project site are expected to be negligible and short term with implementation of clearance surveys; construction buffers around active nests during the breeding season (sometimes called “seasonal clearing restrictions”); and measures to minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project. The Applicant would be required to implement a WEAP, Site Restoration Plan, Integrated Weed Management Plan, PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including fire protection and waste management), Lighting Plan, and BBCS, which would reduce adverse effects.

Decommissioning. Decommissioning could result in short-term negative impacts on individual birds and habitats within and adjacent to the Project site due to equipment use and disturbance during decommission activities. Potential negative impacts would be reduced as reclamation proceeds. Reclamation would be a long and likely slow process but would follow a Decommissioning Plan and a Site Restoration Plan. It would take several decades or longer before the site becomes functioning habitat again, similar to existing conditions.

Residual Effects

Residual effects include the long-term (potentially 100 years or more) loss of approximately 7,097 acres (2,872 hectares) of wildlife habitat, which would reduce the overall regional habitat available.

Cumulative Effects

Construction and operation of the projects considered in the cumulative analysis could directly injure or kill wildlife species, including migratory birds and their eggs. Vegetation would be removed to allow for installation of various facilities, resulting in habitat loss and fragmentation. Indirect effects on wildlife and migratory bird species could occur from herbicide use, dust, noise, lighting, and other changes in the

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area. The cumulative effect would be substantially adverse. The Proposed Action would involve the use of equipment and vehicles that could directly or indirectly harm wildlife and migratory bird species during construction and operation, similar to the cumulative projects. The cumulative loss of habitat under various projects would adversely affect wildlife species. The Project would contribute to the adverse cumulative effect on wildlife and migratory birds. Implementation of various plans and mitigations, including the Lighting Plan, PUP, and MMs WILD-1 through WILD-6, would reduce the Project's contribution to the cumulative adverse effect.

All Mowing Alternative

Wildlife

Effects on wildlife would be reduced under the All Mowing Alternative compared to those of the Proposed Action. Some impacts on native desert creosote bush scrub vegetation, which provides habitat for numerous wildlife species, would still occur. The All Mowing Alternative would result in the removal of 200 acres (81 hectares) of vegetation, primarily for internal access roads, utility corridors within the site, the O&M building, substations, and gen-tie access roads. MM WILD-1 requires disturbance areas to be refined and designed to the minimum size needed to safely and legally operate the facility, including access roads, prior to issuance of an NTP for construction, further reducing impacts. Up to 20 percent of the vegetation within the mowed areas would be crushed during solar array installation. This vegetation is expected to rebound within a few years of construction, based on evidence from other Mojave Desert solar facilities where vegetation was crushed and allowed to regrow. General wildlife species that can fly over, fit through, climb over, or crawl or burrow under the security fencing are expected to continue to inhabit the solar facility, both during construction and O&M.

Direct effects on general and special status, non-listed wildlife species (such as through injury or mortality) may occur from contact with construction and maintenance equipment and/or Project facilities, similar to the Proposed Action. MMs WILD-2 through WILD-5 would be implemented to protect wildlife during project construction and O&M. To prevent injury to wildlife, the ponds would be fitted with exclusion devices and/or textured material on the bottom and sides of the ponds to allow animals to escape, per MM WILD-6.

The use of herbicides (either properly or improperly) could also adversely affect general and special status wildlife species; however, the need for herbicides would be reduced under the All Mowing Alternative as compared to the Proposed Action. Since native vegetation would largely remain in place, fewer weeds are expected to occupy the solar array areas. The use of equipment during construction and some crushing of vegetation under equipment tracks as well as the use of equipment during O&M may create opportunities for the spread of invasive species, but not to the extent that the Proposed Action would with full removal of native vegetation. Possible direct effects on wildlife from herbicides from contact with or ingestion of treated materials could result in death, damage to vital organs, decrease in body weight, decrease in healthy offspring, and increased susceptibility to predation, depending on the exposure time and amount, as previously stated for the Proposed Action. A Weed Management Plan and PUP would be required to specify the types, quantities, and control measures needed for herbicide application, which would minimize effects.

As stated for the Proposed Action, potentially suitable foraging habitat for bat species is present in the Project area, but the habitat is not expected to be of high quality due to the lack of permanent water. The All Mowing Alternative would maintain native vegetation on site, which could provide foraging habitat for any bats in the area. Ongoing monitoring efforts for the Project (which will be described in the BLM-

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required BBBS) and other proposed solar projects in the region, would address impacts on bats from solar development.

Potential indirect effects on wildlife from both construction and operation of the All Mowing Alternative would be reduced compared to those of the Proposed Action, since surface water and sediment runoff from the solar facility, dust generated by Project activities, spread of invasive species, use of herbicides, habitat fragmentation, loss of foraging habitat, and harassment would be minimized under the All Mowing Alternative by maintaining native vegetation in the solar development areas. Potential indirect effects are expected to be minimal with implementation of Project design features that would control and minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project. The Applicant would implement a WEAP, Integrated Weed Management Plan (including specifications for herbicide use), PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan. A Site Restoration Plan would be required, similar to the Proposed Action. MM VG-1 would also be implemented for the All Mowing Alternative. The measure requires that the Site Restoration Plan address weed identification, removal, and herbicide use in a PUP, in addition to restoration. Herbicide use would only be conducted in accordance with an approved PUP, as described in Chapter 2: Proposed Action and Alternatives. With implementation of these various plans, indirect effects on general wildlife are not anticipated to be adverse.

The fencing around the Project could block the free movement of any wildlife that cannot fit through, over, or under the fence. Since smaller wildlife species that may not fit over or under the fence easily are common and abundant, effects would not be adverse. Impacts on the movements of large game species (e.g., bighorn sheep) would be minimal since these species rarely use the Project area.

The Project is not located in close enough proximity to any ACECs to generate indirect effects, such as could occur from noise, in areas designated for special status species. The closest ACEC is Hidden Valley ACEC, located 3.3 miles (5.3 kilometers) to the southeast in the Muddy Mountains, as described for the Proposed Action.

Decommissioning could have impacts on general wildlife during the process of removing the facility, similar to the impacts of construction. Impacts would be short term and, given the abundance of common species, would not be adverse. Restoration of the Project site to functional habitat would be much quicker under the All Mowing Alternative than for the Proposed Action, since much of the native vegetation would remain in place. Some vegetation may be crushed during facility removal, similar to that described for construction, but is expected to rebound within a few years. A Site Restoration Plan and Decommissioning Plan would be prepared and implemented for the All Mowing Alternative.

Residual effects include the long-term alteration of over approximately 7,115 acres (2,879 hectares) of native wildlife habitat, which would reduce the overall regional habitat available. Cumulative impacts would be similar to those described for the Proposed Action, although the Project's contribution under the All Mowing Alternative would be reduced because vegetation would remain on site.

Migratory Birds

Construction and development of the solar facility and gen-tie lines under the All Mowing Alternative would result in the loss of approximately 200 acres of habitat (81 hectares) and the alteration of the remaining habitat that is mowed. Alteration of habitat could have an impact on avian species that use desert creosote bush scrub habitat. While mowed vegetation would be considered altered habitat, effects would be reduced compared to those under the Proposed Action. Similar habitat is common across the region.

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Construction activities (or maintenance activities involving heavy equipment) under the All Mowing Alternative could result in the direct injury or death of nesting birds and their eggs, similar to the Proposed Action. MM WILD-8 requires avoidance of habitat-altering activities, including driving over vegetation for construction or maintenance during bird breeding season to the extent possible, which generally occurs from February 15 through August 31, as described for the Proposed Action.

Direct effects on avian species from bird collisions with construction equipment, transmission lines, and facility lighting would all be the same as for the Proposed Action, as these elements would be the same under both alternatives. Implementation of APLIC measures and the BBCS would reduce the risk of collision and electrocution. The BBCS would include a robust systematic monitoring and adaptive management plan for the Project to assist in avoiding and minimizing impacts on migratory birds, per MM WILD-7. Implementation of MMs WILD-2 through WILD-5 would further minimize adverse effects. Construction would require the temporary development of up to four, 1-acre (0.4-hectare) ponds to store construction water, similar to the Proposed Action. Migratory birds may be attracted to the water. The ponds would not contain any chemicals that are not approved in the PUP, which would address any potential for harm to wildlife, including migratory birds. To prevent injury to birds, the ponds would be fitted with exclusion devices that could include floating balls, fencing, or covering (non-netted) to minimize use by birds, per MM WILD-6.

Indirect impacts on migratory birds from surface water and sediment runoff from disturbed areas, dust generated by Project activities, noise, lighting, spread of invasive species, use of herbicides, accidental spills, harassment, territory abandonment, increased opportunity for predators, habitat fragmentation, avoidance due to increased human presence, and altered hydrology would generally be reduced compared with those of the Proposed Action given the maintenance of native vegetation and habitat in the solar development areas. Indirect effects on areas outside the Project site are expected to be negligible and short term with implementation of clearance surveys; construction buffers around active nests during the breeding season (sometimes called “seasonal clearing restrictions”); and measures to minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project.

Decommissioning could have impacts on migratory birds during the process of removing the facility, similar to the impacts of construction. Restoration of the Project site to functional habitat would be much quicker than for the Proposed Action, since much of the native vegetation would remain in place. A Site Restoration Plan and Decommissioning Plan would be prepared and implemented for the All Mowing Alternative.

Residual Effects

Residual effects include the long-term alteration of over approximately 7,115 acres (2,879 hectares) of native avian habitat and an ongoing potential for impacts on individual birds through bird strikes or other accidents.

Cumulative Effects

Cumulative effects would be similar to those described for the Proposed Action, although the Project’s contribution under the All Mowing Alternative would be reduced because vegetation would remain over the solar development areas.

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Hybrid Alternative

Wildlife

Effects on wildlife would be reduced for the Hybrid Alternative compared to those under the Proposed Action. Impacts on native desert creosote bush scrub vegetation that provides habitat for numerous wildlife species would occur due to the permanent removal of 2,603 acres (1,053 hectares) of vegetation for construction of the solar facility and gen-tie lines (as compared with 7,097 acres [2,872 hectares] for the Proposed Action). Up to 20 percent of the vegetation within the mowed areas would be crushed during solar array installation. Mowed areas would comprise 4,460 acres (1,805 hectares). This vegetation is expected to rebound within a few years of construction, based on evidence from other Mojave Desert solar facilities where vegetation was crushed and allowed to regrow, as stated for the All Mowing Alternative. MM WILD-1 requires disturbance areas to be refined and designed to the minimum size needed to safely and legally operate the facility, including access roads, prior to issuance of an NTP for construction, further reducing impacts. General wildlife species that can fly over, fit through, climb over, or crawl or burrow under the security fencing are expected to continue to inhabit the solar facility, both during construction and O&M.

Direct effects on general and special status, non-listed wildlife species (such as through injury or mortality) may occur from contact with construction and maintenance equipment and/or Project facilities, similar to the Proposed Action. MMs WILD-2 through WILD-5 would be implemented to protect wildlife during project construction and O&M. To prevent injury to wildlife, the ponds would be fitted with exclusion devices and/or textured material on the bottom and sides of the ponds to allow animals to escape, per MM WILD-6.

The use of herbicides (either properly or improperly) could also adversely affect general and special status wildlife species; however, the need for herbicides would be reduced under the Hybrid Alternative. Since native vegetation would largely remain in place, fewer weeds are expected to occupy the solar array areas in the mowed areas. The use of equipment during construction and crushing of vegetation under equipment tracks as well as the use of equipment during O&M may create opportunities for the spread of invasive species, but not to the extent of the Proposed Action. The acreage constructed using traditional methods would require intensive vegetation management to minimize weeds and would include the use of herbicides. Possible direct effects on wildlife from herbicides from contact with or ingestion of treated materials could result in death, damage to vital organs, decrease in body weight, decrease in healthy offspring, and increased susceptibility to predation, depending on exposure time and amount, as previously stated for the Proposed Action. An Integrated Weed Management Plan and PUP would be required to specify the types, quantities, and control measures needed for herbicide application, which would minimize effects.

As stated for the Proposed Action, potentially suitable foraging habitat for bat species occurs in the Project area, but the habitat is not expected to be of high quality due to the lack of permanent water. The Hybrid Alternative would maintain native vegetation on site that could provide foraging habitat for any bats in the area. Ongoing monitoring efforts for the Project (which will be described in the BLM-required BBCS) and other proposed solar projects in the region would address impacts on bats from solar development.

Potential indirect effects on wildlife from both construction and operation of the Hybrid Alternative would be reduced compared with those of the Proposed Action, since surface water and sediment runoff from the solar facility, dust generated by Project activities, spread of invasive species, use of herbicides,

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habitat fragmentation, loss of foraging habitat, and harassment would be minimized under the Hybrid Alternative by maintaining native vegetation over 65 percent of the facility. Potential indirect effects are expected to be reduced with implementation of Project design features that would control and minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project, particularly in areas constructed using traditional methods. The Applicant would implement a WEAP, Integrated Weed Management Plan (including specifications for herbicide use), PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan. A Site Restoration Plan would be required, similar to the Proposed Action. MM VG-1 would also be implemented for the Hybrid Alternative. The measure requires that the Site Restoration Plan address weed identification, removal, and herbicide use in a PUP in addition to restoration. Herbicide use would only be conducted in accordance with an approved PUP, as described in Chapter 2: Proposed Action and Alternatives. With implementation of these various plans, indirect effects on general wildlife are not anticipated to be adverse.

The fencing around the Project could block the free movement of any wildlife that cannot fit through, over, or under the fence. In areas of traditional development, there would be no habitat within the fenced area for any wildlife that crossed into the facility. Since smaller wildlife that may not fit over or under the fence easily are common and abundant, effects would not be adverse. Impacts on the movements of large game species (e.g., bighorn sheep) would be minimal since these species rarely use the Project area.

The Project is not located in close enough proximity to any ACECs to generate indirect effects, such as could occur from noise, in areas designated for special status species. The closest ACEC is Hidden Valley ACEC, located 3.3 miles (5.3 kilometers) to the southeast in the Muddy Mountains, as described for the Proposed Action.

Decommissioning could have impacts on general wildlife during the process of removing the facility, similar to the impacts of construction under the Hybrid Alternative. Impacts would be short term and, given the abundance of common species in the larger region, would not be adverse. Restoration of the Project site to functional habitat would be quicker in mowed areas where native vegetation would remain in place for the life of the solar facility. Some vegetation may be crushed for facility removal, similar to that described for construction, but is expected to rebound within a few years. Where vegetation is completely removed in the areas of traditional development, restoration would take decades or longer before these areas return to functional wildlife habitat. A Site Restoration Plan and Decommissioning Plan would be prepared and implemented for the Hybrid Alternative.

Migratory Birds

Construction and development of the solar facility and gen-tie lines under the Hybrid Alternative would result in the loss of approximately 2,603 acres (1,053 hectares) of habitat. Alteration of habitat could have an impact on avian species that use desert creosote bush scrub habitat. While mowed vegetation would be considered altered habitat, effects would be reduced compared to those under the Proposed Action. Similar habitat is common across the region.

Construction activities (or maintenance activities involving heavy equipment) under the Hybrid Alternative could result in the direct injury or death of nesting birds and their eggs, similar to the Proposed Action. MM WILD-8 requires avoidance of habitat-altering activities, including driving over vegetation for construction or maintenance of mowed areas during bird breeding season to the extent possible, which generally occurs from February 15 through August 31, as described for the Proposed Action.

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Direct effects on avian species from bird collisions with construction equipment, transmission lines, and facility lighting would be the same as for the Proposed Action, as these elements would be the same under the Hybrid Alternative as the Proposed Action. Implementation of APLIC measures and the BBCS would reduce the risk of collision and electrocution. The BBCS would include a robust systematic monitoring and adaptive management plan for the Project to assist in avoiding and minimizing impacts on migratory birds, per MM WILD-7. Implementation of MMs WILD-2 through WILD-5 would further minimize adverse effects. Construction would require the temporary development of up to four, 1-acre (0.4-hectare) ponds to store construction water, similar to the Proposed Action. Migratory birds may be attracted to the water. The ponds would not contain any chemicals that are not approved in the PUP, which would address any potential for harm to wildlife, including migratory birds. To prevent injury to birds, the ponds would be fitted with exclusion devices that could include floating balls, fencing, or covering (non-netted) to minimize use by birds, per MM WILD-6.

Indirect impacts on migratory birds from surface water and sediment runoff from disturbed areas, dust generated by Project activities, noise, lighting, spread of invasive species, use of herbicides, accidental spills, harassment, territory abandonment, increased opportunity for predators, habitat fragmentation, avoidance due to increased human presence, and altered hydrology would generally be reduced compared with those of the Proposed Action given that the Hybrid Alternative would maintain native vegetation and habitat over 65 percent of the Project site. Indirect effects on areas outside the Project site are expected to be negligible and short term with implementation of clearance surveys; construction buffers around active nests during the breeding season (sometimes called “seasonal clearing restrictions”); and measures to minimize soil erosion, dust, stormwater runoff, and water quality impacts during all phases of the Project.

Decommissioning could have impacts on migratory birds during the process of removing the facility, similar to the impacts of construction. Restoration of the Project site to functional habitat would be much quicker than for the Proposed Action in mowed areas but similar in areas of traditional development (and would take several decades in these areas). A Site Restoration Plan and Decommissioning Plan would be prepared and implemented for the Hybrid Alternative.

Residual Effects

Residual effects include the long-term alteration of native habitat over approximately 7,062 (2,858 hectares) of avian habitat and ongoing potential for impacts on individual birds through bird strikes or other accidents.

Cumulative Effects

Cumulative effects would be similar to those described for the Proposed Action, although the Project’s contribution under the Hybrid Alternative would be less because vegetation would remain over 65 percent of the solar development areas.

No Action Alternative

Under the No Action Alternative, the Project would not be built, and no impacts on wildlife or special status species would occur.

Mitigation Measures

- MM WILD-1: Reduced Project Footprint (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)

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3.7 Wildlife, Migratory Birds, and Special Status Species

- MM WILD-2: Qualified Biologist (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-3: Worker Environmental Awareness Program (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-4: Elimination of Wildlife Hiding Locations (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-5: Elimination of Conflicts with Wildlife (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-6: Fitting of Water Supply Ponds with Wildlife Protection Devices (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-7: Bird and Bat Conservation Strategy Requirements (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-8: Nesting Bird Avoidance and Minimization (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM VG-1: Requirements of the Site Restoration Plan and Integrated Weed Management Plan (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

3.8 Threatened, Endangered, and Candidate Species

3.8.1 Affected Environment

Introduction

This section identifies the threatened, endangered, and candidate species that are known to occur or could occur in the Project area and that could be affected by Project construction, O&M, and decommissioning. One endangered species is known to occur on the Project site, the Mojave Desert tortoise.

Federally listed species are currently managed in accordance with USFWS recovery plans or conservation agreements; the Endangered Species Act of 1973, as amended (16 USC § 1531 et seq.); and BLM Manual 6840, Special Status Species Management. The Endangered Species Act forbids acts that result in the “take” of listed species without a permit, per Section 7. The term “take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such activity (16 USC § 1532[18]). Additional information on laws and regulations pertaining to federally threatened, endangered, and candidate species is provided in Appendix E.

Data Sources and Methodology

Mojave Desert tortoise surveys were conducted in September and October 2017, and April and May 2018. The data from and methods used to perform these studies are documented in the *Desert Tortoise Survey Report (Areas A-E)* (Phoenix Biological Consulting 2018b) and *Desert Tortoise Survey Report (Areas B1, B2, F&G)* (Phoenix Biological Consulting 2018c).

Analysis Area

The analysis area (also referred to as the study area in this section) for threatened, endangered, and candidate species is the Project site, as well as the Mojave Desert tortoise translocation areas discussed under the alternatives. The analysis area also includes the greater Project region for consideration of impacts related to habitat connectivity.

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3.8 Threatened, Endangered, and Candidate Species

Affected Environment

The only federally threatened, endangered, or candidate species known or with potential to occur in the Project area is the Mojave Desert tortoise. The Mojave Desert tortoise is listed as federally threatened under the Endangered Species Act. Phoenix Biological Consulting conducted protocol-level presence/absence surveys for the species. The surveys were conducted in accordance with USFWS 2010 guidelines for the purpose of estimating desert tortoise densities within the Project's impact area. The desert tortoise surveys were conducted for the Proposed Action area between September 4 and October 19, 2017. Additional surveys were conducted for areas to be considered under the NEPA alternatives (development areas B1, B2, F⁹, and G) between April 3 and April 12 and May 7 and May 27, 2018. The surveys collected data on the condition and location of desert tortoise individuals, burrows, pellets, carcasses, scat, and other signs of presence. Table 3.8-1 summarizes the survey areas and desert tortoise observation results. High concentrations of active desert tortoise burrows were observed in development area B, where most of the live desert tortoise were observed. The highest densities of desert tortoise were found in development areas B, B1 B2, and G, which is generally the southwest portion of the Project site (refer to Figure 3.8-1 for a map of live tortoise locations identified during surveys). The lowest-density desert tortoise areas were found in development area F—where no tortoises with a larger than 180 millimeter (mm) mean carapace length (MCL) were identified, likely due to the presence of sandy soils—followed by E and D, which is generally the east side of the Project site.

The survey reports provide estimated densities of desert tortoise in the Proposed Action area (and alternative areas) calculated using the confidence intervals provided by the USFWS 2010 spreadsheet for estimates of tortoise abundance for the 2017 survey and the USFWS 2017 spreadsheet for estimates of tortoise abundance for the survey conducted in 2018. The average density of adult desert tortoises in the Proposed Action area is 18.6 per square mile (7.2 per square kilometer), for the All Mowing Alternative is 22.8 per square mile (8.8 per square kilometer), and for the Hybrid Alternative is 19.9 per square mile (7.7 per square kilometer).

The Project site generally supports high-quality habitat for the species, and, of the studies completed, this region has the highest known densities of desert tortoise in the Northeastern Mojave Recovery Unit. The Moapa Solar Project (located approximately 1.7 miles [2.8 kilometers] north of the Project site) had a higher average density of 31.9 adult tortoises per square mile (12.4 per square kilometer). Playa Solar (located approximately 5.8 miles [9.3 kilometers] southwest of the Project site) had a slightly lower average density of 13.1 adult tortoises per square mile (5.1 per square kilometer). The average density in the desert tortoise critical habitat units (CHUs) within the Northeastern Mojave Recovery Unit was 10.9 adult tortoises per square mile (4.4 per square kilometer) in 2014 (USFWS 2014). The estimated number of tortoises in the Northeastern Mojave Recovery Unit has increased from 2004 to 2014 (4,920 adult-sized desert tortoises to 18,220, for a 270 percent increase). The Northeastern Mojave Recovery Unit is the only recovery unit with a currently increasing population of desert tortoises (USFWS 2015b). The USFWS attributes the increase to the increased survival of adults and sub-adults moving into adult size classes (USFWS 2015a).

⁹ Development area F was considered part of the study area during alternatives development, but was not incorporated into any of the alternatives carried forward in the EIS due to the presence of a large population of the state-endangered threecorner milkvetch.

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3.8 Threatened, Endangered, and Candidate Species

Table 3.8-1 Desert Tortoise Survey Areas and Results and Population Density Estimates

Survey Area	Acres (Square Kilometers) of Total	Percent of Total	Total Desert Tortoise Observed	Number of Desert Tortoise ¹	Acres (Square Kilometers) per Tortoise ¹	Estimated Number of Desert Tortoises using USFWS Confidence Intervals	Estimated Density of Desert Tortoises per Square Mile (Square Kilometers)
Proposed Action Areas							
Development Area A	862 (3.4)	11.5%	14	14	62 (0.2)	28	21.1 (8.2)
Development Area B	3,460 (13.8)	46.2%	94	74	47 (0.2)	149	27.8 (10.7)
Development Area C	471 (1.9)	6.3%	6	6	79 (0.3)	12	16.6 (6.4)
Development Area D	1,913 (7.7)	25.6%	11	10	191 (0.8)	20	6.8 (2.6)
Development Area E	402 (1.6)	5.4%	1	1	402 (1.6)	2	3.2 (1.3)
Gen-tie and Collector Lines	103 (0.4)	1.4%	2	2	52 (0.2)	4	25.3 (9.8)
Buffer Areas	270 (1.1)	3.6%	0	0	-	0	0 (0)
TOTAL	7,481	100%	128	107	-	215	18.6 (7.2)
Alternative Areas							
Development Area B1	141 (1.1)	3.8%	2	2	71 (0.3)	4	16.6 (7.1)
Development Area B2	979 (3.9)	26.3%	23	20	49 (0.2)	36	23.9 (9.2)
Development Area F	1,832 (7.3)	49.2%	1	0	-	0	0
Development Area G	770 (3.1)	20.7%	16	14	55 (0.2)	25	21.3 (8.21)
TOTAL	3,772	100%	42	36	-	65	21.8 (8.4)²
Notes:							
1. ≥ 180 mm MCL							
2. Not including development area F, which does not appear to support desert tortoise due to the sandy soil type present here							

Source: (Phoenix Biological Consulting 2018b, Phoenix Biological Consulting 2018c)

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The desert tortoise population in the Project area is connected (genetically and demographically) to other tortoise populations in the region, although there are varying degrees of barriers. Minimal barriers are found between the on-site tortoises and tortoises throughout the north and northeast parts of the Dry Lake Valley, towards the North Muddy Mountains. The I-15 and the Union Pacific Railroad provide substantial barriers between the Project area and the Dry Lake Valley to the west and north, although culverts under the I-15 allow tortoises to travel across the interstate. The Muddy River provides an impermeable barrier to the north, and Lake Mead provides an impermeable barrier to the east.

The federally listed Endangered Moapa dace (*Moapa coriacea*) is not present within the Project area but occurs in the greater region. This fish species is found in spring pools, tributaries (spring outflows), and the main stem of the Muddy River, over 13 miles (21 kilometers) from the Project site.

3.8.2 Environmental Consequences

Proposed Action

Direct Effects

Construction and Operation/Maintenance. Direct effects on desert tortoises within the Project area would occur during construction and O&M of the Project. Direct effects include the take of up to the estimated 215 adult tortoise (and the estimated 900 or more juveniles) expected to be found on the Project site during construction; death or injury to tortoises within the construction areas of the gen-tie line routes; and permanent loss of desert tortoise habitat.

The Proposed Action would result in the direct or indirect take of up to all tortoises found on the Project site, since there are no places within the Northeastern Mojave Recovery Unit where the tortoises can be moved. Construction would result in the removal of all vegetation and habitat over approximately 7,097 acres (2,872 hectares) that otherwise supports desert tortoise and would include fencing that would exclude tortoise movement. The take of all adult and juvenile tortoises on the Project site, in addition to the loss of habitat, would also result in a substantial adverse impact on the species and the local population. MM WILD-1 requires that the footprint of the solar facility be reduced to the minimum size needed; however, substantial loss of habitat and a substantial take of tortoises would still occur.

Construction and O&M of the gen-tie line could result in additional injury or take of desert tortoises found along the gen-tie routes and some loss of habitat for the creation of access roads. High-density tortoise habitat with an estimated 25.4 adult tortoises per square mile (9.8 per square kilometer) is found along the gen-tie routes. During the construction phase of the gen-tie lines between the Project site and Crystal Substation, direct desert tortoise encounters with construction equipment could occur, which could result in displacement, injury, or death of tortoises. Temporary laydown areas for gen-tie line construction would be 200 by 200 feet (61 by 61 meters) at up to 48 poles, outside the solar facility fence, totaling 38 acres (15 hectares). Multiple pulling sites would total 15 acres (6 hectares) of temporary impacts on desert tortoise habitat, at 100 by 500 feet (31 by 152 meters). Desert tortoises would be displaced from these areas during construction. Permanent loss of habitat would occur in the footprint of the tubular steel monopoles or lattice towers and for the access roads. The roads would be constructed in accordance for use by NV Energy at a minimum 20 feet (6.1 meters) wide with an all-weather (aggregate) surface. The permanent habitat loss associated with the pole or tower locations and access roads total approximately 24 acres (10 hectares). Desert tortoise burrows could also be crushed and therefore lost during the construction of access roads and installation of poles or towers and by vehicles traveling along access roads. Construction would also result in the temporary loss of desert tortoise habitat for laydown

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areas and pulling sites. Potential adverse effects would be reduced through implementation of MM WILD-2 through MM WILD-5, which require biological monitors or Authorized Biologists (approved by USFWS) to be present at all active construction locations along the gen-tie routes, implementation of a WEAP, measures to minimize wildlife (including desert tortoise) entrapment in construction materials or excavations, and measures to reduce conflicts with wildlife (including desert tortoise) such as reducing vehicle speeds.

Other direct effects could occur from exposure to increased noise. Noise during construction would be temporary and generally range from 70 to 80 dBA L_{eq}^{10} at 50 feet (15 meters). Desert tortoises outside of the solar facility boundary may experience intermittent exposure to increased noise levels, but desert tortoises are not expected to be substantially affected by temporary construction noise. Noise levels during O&M of the Project are expected to be minimal.

The nearest designated Critical Habitat for desert tortoise is within the Mormon Mesa CHU, which overlaps with the Coyote Springs ACEC to the northwest of the Project area, far outside of the area of direct effects. The Project would not result in direct effects on Critical Habitat for desert tortoise or any primary constituent elements.

Project construction and O&M would not have direct impacts on the Moapa dace due to the distance (over 13 miles [21 kilometers]) between the Project and this species' habitat.

Decommissioning. Decommissioning could result in short-term, direct, negative impacts on desert tortoise from increased activity during the decommissioning process, mostly along the gen-tie lines, since decommissioning of the solar facility would occur within the fenced areas. Reclamation would be a long and likely slow process but would follow a Decommissioning Plan and a Site Restoration Plan. The Project site would become available to desert tortoise once equipment and fences have been removed, but it would take several decades or longer, if ever, before the area becomes functioning habitat. Decommissioning would not have any direct impacts on desert tortoise Critical Habitat nor on Moapa dace.

Indirect Effects

Construction and Operation/Maintenance. The area of indirect effects is defined as the area within 5 miles (8 kilometers) of the Project site, which is the general range of tortoises. Indirect effects do not involve ground-disturbing activities but instead are effects related to habitat fragmentation and reduced connectivity; habitat degradation and harm caused by lower quality food sources from the spread of weeds; increased predation; lighting; and accidental spills.

The construction and operation of the Proposed Action would result in local habitat fragmentation for desert tortoises in the surrounding areas. Habitat fragmentation would significantly change the dispersal opportunities for desert tortoises moving throughout the area, as the Project would eliminate dispersal through approximately 7,097 acres (2,872 hectares or 28 square kilometers), or approximately 15 percent of the suitable habitat in the immediate area. The site would present a new barrier to tortoises (i.e., tortoises could move around to the other side of the site, but not through it). In particular, the movement of tortoises from east to west to the North Muddy Mountains would be constrained by the Proposed Action. The fencing of the facility would form an approximately 6-mile-long (9.6-kilometer-long) barrier to east-west migration and an approximately 3-mile-wide (4.8-kilometer-wide) barrier to north-south

¹⁰ dBA is A-weighted decibels, and the L_{eq} is the equivalent sound level measured over a 1-hour period (refer to Section 3.11, Acoustics, for further description).

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migration. The southern end of development area D is approximately 1 mile (1.6 kilometers) from the Muddy Mountains (since tortoise habitat is limited to the valley and not the mountains) and would create a pinch-point for tortoise migration in a northeast/southwest direction past that point. Reduced connectivity through the larger area would result in increased localized densities, reduced gene pool flow, and increased stressors that could affect survival of tortoises. These effects would be considered adverse.

Several other indirect effects could occur. A study found that a diet of red brome (*Bromus madritensis*), an invasive weed, reduces the growth and survival of juvenile desert tortoise (Esque 2019). As such, the spread of weeds, which would reduce the quality of cover as well as foraging habitat, would be an indirect effect. Other indirect effects include attracting ravens to the site, resulting in increased predation of young (with the threat increased if lattice steel towers are used for the gen-tie that would provide perching opportunities for ravens), and runoff of contaminated stormwater from spills of hazardous materials (e.g., petroleum products, herbicides, dust palliatives). These indirect effects from the Proposed Action would be addressed through implementation of Project design features and mitigation that control soil erosion, stormwater runoff, and water quality during all phases of the Project. The Applicant would implement the WEAP, as well as the Raven Management Plan, Site Restoration Plan, Integrated Weed Management Plan, PUP identifying the allowable herbicides and applications (as discussed in Chapter 2: Proposed Action and Alternatives), SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan to reduce indirect adverse effects on desert tortoise. While effects can be reduced, they may not be sufficiently minimized even with mitigation.

Construction, O&M, and decommissioning of the Proposed Action would not result in indirect effects on Critical Habitat for desert tortoise or any primary constituent elements due to the distance to these areas. Very limited, if any, connectivity is found between the Project area and Critical Habitat in the Mormon Mesa CHU. Due to the very limited connectivity to the Mormon Mesa CHU, impacts on gene flow in the Mormon Mesa CHU are not anticipated.

Indirect impacts on Moapa dace would not occur, even if the on-site groundwater pumping option is exercised. Refer to Section 3.5: Water Resources for a discussion of groundwater drawdown. Based on modeling, there would be no groundwater drawdown impacts from Project pumping at the Muddy River or the springs feeding the Muddy River that support Moapa dace. Cumulative groundwater impacts that could affect the Moapa dace are discussed later in this section.

Decommissioning. Similar indirect effects during decommissioning could occur as those described for construction. A Decommissioning Plan and Site Reclamation Plan would be prepared for the BLM's review and approval. Decommissioning would have no impact on the Moapa dace.

Residual Effects

Residual effects include the long-term (potentially 100 years or more) loss of approximately 7,097 acres (2,872 hectares) of desert tortoise habitat, which would reduce the overall regional habitat available for species recovery. The loss of up to 215 adult desert tortoises and an unknown number of juveniles would have adverse residual effects on the species and the local population size.

Cumulative Effects

Many of the projects considered in the cumulative analysis would be constructed in areas with desert tortoise habitat or where desert tortoises have been observed. Few to no places to translocate desert tortoise remain in the Northeastern Mojave Recovery Unit. Facility installation for the cumulative projects would involve vegetation removal, resulting in the loss and fragmentation of desert tortoise

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habitat. Cumulative adverse effects on desert tortoises and their habitat from the development of large-scale solar and other cumulative projects would be substantial.

The Proposed Action would directly impact and result in the loss of approximately 7,097 acres (2,872 hectares) (0.27 percent) of suitable desert tortoise habitat out of the total 2.63 million acres (1.06 million hectares) available within the Northeastern Mojave Recovery Unit. Other projects with large-scale and permanent direct and indirect impacts on desert tortoise habitat include several solar projects within the cumulative effects area. These projects include solar developments within the Dry Lake Solar Energy Zone (SEZ) (#8 and #9 from Table 3.0-1), with an estimated 3,000 acres (1,214 hectares) of impacts on desert tortoise habitat (USFWS 2015b); the Moapa Solar Project (#6 from Table 3.0-2), with an estimated 1,100 acres (445 hectares) of tortoise habitat impacts; the Aiya Solar Project (#11 from Table 3.0-2), with an estimated 672 acres (272 hectares) of impacts; and the Eagle Shadow Mountain Solar Project (#12 from Table 3.0-2). The impact area for the latter project is not yet known, but may be on the order of 2,000 to 3,000 acres (809 to 1,214 hectares). Solar projects, therefore, could cumulatively result in approximately 15,000 acres (6,070 hectares) of impacts, or 0.6 percent of the regional habitat, with the Gemini Solar Project, along with the Moapa Solar Project, located in areas of the highest known densities of desert tortoise and contributing nearly half of those impacts. Transmission projects also have effects on desert tortoise and their habitat due to increased predation, disturbance, and proliferation of weeds, contributing to cumulative impacts on the species and its habitat. The Project would contribute to the cumulative adverse loss of desert tortoise habitat in the region. Implementation of MMs WILD-1 through WILD-5 would reduce but not eliminate the Project's contribution to cumulative, adverse effects on tortoises, which would include the loss or take of up to 215 adult individuals and additional juveniles in addition to the loss of habitat.

Several of the cumulative projects (#1, #8, #9, #12, #19, #21, and #24 from Table 3.0-2) may also require groundwater for dust suppression. The sources of water for these projects are not known and the timing of their construction may or may not overlap with that of the Project. If water for those projects is withdrawn from the LWRFS, a cumulative impact on the regional aquifer system and the Muddy River could occur, both of which support the federally Endangered Moapa dace. Per Interim Order #1303, the State Engineer has placed a moratorium on new water appropriations from the LWRFS until a sustainable yield can be determined. Other projects may also obtain a temporary Change in Use of existing appropriations. The process for obtaining the temporary Change in Use would include consideration of cumulative amounts of groundwater withdrawn from the flow system. Temporary Change in Use authorizations are typically granted for 1 year at time, and construction water durations are usually short, reducing the potential for large overlaps in construction water needs. The USFWS also tracks any groundwater pumping under a 2006 Biological Opinion (1-5-05-FW-536) in the California Wash Basin (as well as other basins in the LWRFS) to ensure that water at the Warm Springs gauge flowing into the Muddy River does not fall below 2.7 cfs (0.08 cms) in order to prevent impacts on Moapa dace. If cumulative effects caused flows to fall below 2.7 cfs (0.08 cms), it is expected that pumping may need to be reduced across multiple projects. The Applicant may need to secure alternative sources of water, such as by purchasing and trucking water or modifying construction to meet dust control requirements. The Project's operational water needs are minimal and would not likely contribute to a cumulative impact.

All Mowing Alternative

Direct Effects

It is expected that approximately 254 adult desert tortoises would be encountered on the Project site for the All Mowing Alternative (an estimated 21.8 adult tortoises per square mile [8.4 per square kilometer]).

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Distantly moving desert tortoises (translocating them) to another region of the Northeastern Mojave Recovery Unit has been a last-resort approach on other solar projects in the region and is not an option for this Project. There are no known areas large enough to accept the desert tortoises that meet the USFWS desert tortoise translocation guidance definition of “depleted population”¹¹.”

The purpose of mowing under this alternative is to maintain vegetation and soils within the solar facility so that the desert tortoises would have the opportunity to return to the site once construction is completed (recognizing that the habitat on the Project site would be substantially altered). Desert tortoises would need to be moved or translocated from the Project site during construction. The process would include installing desert tortoise fencing around the development area being constructed, conducting health assessments on the desert tortoises found, and translocating the tortoises outside of the fenced construction areas so that facility construction could occur without the risk of injuring or killing them. The density of desert tortoises outside the Project site is assumed to be similar to that on the Project site (Table 3.8-1). The average densities do not meet the definition of a “depleted population” identified in the USFWS desert tortoise translocation guidance for distant translocation; however, this alternative includes different types of translocation and the opportunity for desert tortoise to reoccupy the solar facility after construction, which makes it a viable alternative. Translocation would be conducted in accordance with a Biological Opinion, Translocation Plan, and Incidental Take Permits issued by the USFWS. Three types of translocation could occur; short distance translocation, reintroduction, and distant translocation. With short distance translocation, tortoises could be translocated outside of the Project site but within 1,640 feet (500 meters) of where they were captured. Tortoises that would be reintroduced, would be held in a pen and then reintroduced at the capture location within the Project site once construction is complete. For distant translocation, approximately 34 adult desert tortoises and an unknown number of juveniles would be translocated to a site south of development areas B and D. Approximately 220 adult tortoises would be reintroduced to the Project site or translocated into the Project area after construction. The impacts of the All Mowing Alternative, compared to the Proposed Action and Hybrid Alternative, are summarized in Table 3.8-2.

Table 3.8-2 Desert Tortoise Impacts by Alternative

Alternative	Desert Tortoises	Desert Tortoises for Distant Translocation	Desert Tortoises for Reintroduction and Short Distance Translocation
Proposed Action	215	215	0
All Mowing Alternative	254	34	220
Hybrid Alternative	219	36	183

Direct impacts could occur during the health assessments and the physical movement of desert tortoises. Holding pens (at the Great Basin Institute) would need to be used until the desert tortoises could be reintroduction into the mowed areas of the solar facility after construction. Ultimately, all of the desert tortoises in the holding pens would be reintroduced to the Project site or translocated back into the Project area.

The All Mowing Alternative would reduce the number of desert tortoises taken, as compared with the Proposed Action. Ongoing operation would result in additional impacts on desert tortoises from human

¹¹ Depleted populations have densities of 10.1 adult tortoises per square mile (3.9 per square kilometer).

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activity during solar facility maintenance. Additional desert tortoise protection measures would be required to reduce effects during O&M, as identified in the Project-specific Biological Opinion and Incidental Take Permit.

Indirect Effects

Tortoises moved immediately outside of the site are expected to remain approximately within their home ranges and thus would be familiar with the area and individual tortoises in the area. By contrast, the 34 translocatees moved to the south of development areas B and D would be unfamiliar with the release area. As a result, these tortoises may be at an increased risk of predation due to temporary unfamiliarity and may experience increased agonistic encounters with residents. The local density of desert tortoises moved immediately outside of the site would approximately double, temporarily, until home ranges shifted. Resources are expected to be adequate in the short term, but agonistic encounters could increase due to social disruption. These tortoises would be adjacent to construction-related activities for over a year, which could result in unknown levels of stress and behavioral disruption. Only tortoises determined to be healthy and asymptomatic of respiratory disease would be translocated. Even so, there is a minor risk that both translocatees and resident tortoises may be adversely affected due to the spread of diseases.

The All Mowing Alternative would reduce other indirect impacts that could occur from habitat fragmentation and changes in connectivity as compared with the Proposed Action. Desert tortoises would be able to move through the Project site (except for a few acres occupied by the O&M facilities and substations) to the North Muddy Mountain to the northeast and to the south, similar to existing conditions.

Several other indirect effects described for the Proposed Action could also occur for the All Mowing Alternative. Night lighting affects tortoise behavior and increases the visibility of tortoises at night, exposing them to potential increased predation by nocturnal predators that could be present on the Project site. Red brome and other invasive species reduce the growth and survival of juvenile desert tortoises (Esque 2019). As such, the spread of weeds and associated reduction in the quality of cover and foraging habitat would be an indirect effect. Because the All Mowing Alternative would leave native vegetation in place, weed spread would be less under this alternative but could still be an issue given the roads, equipment, and vegetation crushing that would occur during construction. Construction of the solar arrays could result in the crushing of up to 20 percent of the vegetation within mowed areas. Crushed vegetation would rebound but could take a few years. Other indirect effects include attracting ravens to the site, resulting in increased predation of young (with increased risks if steel lattice towers are used for the gentle where ravens could perch), and runoff of contaminated stormwater from spills of hazardous materials (e.g., petroleum products, herbicides). As stated in Chapter 2: Proposed Action and Alternatives, only herbicides known to have minimal effects on desert tortoise (per Biological Opinion File No. 84320-2010-F-0365.R038) would be allowed in areas where desert tortoise may be present.

These indirect effects would be addressed through implementation of Project design features and mitigation that control soil erosion, stormwater runoff, and water quality during all phases of the Project. The Applicant would implement the WEAP as well as the Raven Management Plan, Site Restoration Plan, Integrated Weed Management Plan, PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan to reduce indirect adverse effects on desert tortoise.

Construction, O&M, and decommissioning of the Project would not result in indirect effects on Critical Habitat for desert tortoise or any primary constituent elements due to the distance to these areas and the

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very limited connectivity that currently exists between the Project site and the Critical Habitat. No impacts on the Moapa dace would occur, as under the Proposed Action.

Residual Effects

While some tortoises would be taken under the All Mowing Alternative, the take would be considerably less than under the Proposed Action. Vegetation would be removed, mowed, and crushed by equipment during the construction of access roads and solar arrays, but would be maintained in all other portions of the Project site. Desert tortoise habitat over the entire solar facility acreage of 7,115 (2,879 hectares) would be eliminated, but tortoises could reoccupy the site when vegetation returns. However, it is not known whether reoccupation would be successful.

Cumulative Effects

The All Mowing Alternative would result in a similar cumulative loss of desert tortoise habitat from solar projects and other large-scale projects in the region as described for the Proposed Action. The All Mowing Alternative would make a similar contribution to cumulative impacts as the Proposed Action; however, since desert tortoise would be allowed to reoccupy the site after construction, the Project's contribution to the overall cumulative effects from total removal of available acreage for desert tortoise occupation would be less than that of the Proposed Action. Tortoise take would be reduced compared with the Proposed Action, but any take would contribute to cumulative impacts on the species. Other cumulative impacts would be the same as for the Proposed Action, including impacts on Moapa dace.

Hybrid Alternative

Direct Effects

It is expected that approximately 219 adult desert tortoises would be encountered on the Project site for the Hybrid Alternative (an estimated 21.8 adult tortoises per square mile [8.4 per square kilometer]). The purpose of mowing under the Hybrid Alternative is to maintain native vegetation within the areas of the solar facility that previously (pre-Project or baseline) had the highest densities of desert tortoises, as shown in Table 3.8-1. Approximately 65 percent of the facility would be mowed. The desert tortoises would be moved back into the mowed areas once construction is completed, similar to the All Mowing Alternative. On the other 35 percent of the solar facility, approximately 2,351 acres (951 hectares) of native vegetation would be permanently removed (through traditional construction methods), and desert tortoises would be permanently excluded from these areas via tortoise fencing. The areas to be constructed using traditional methods generally have the lowest pre-Project or baseline densities of desert tortoises.

Desert tortoises would need to be moved or translocated from the Project site during construction of the entire site (both areas of traditional development and mowing). The process would include installing desert tortoise fencing in the solar facility area, conducting health assessments on the desert tortoises found, and translocating the tortoises outside of the fenced construction areas so that construction could occur without the risk of injuring or killing them. The density of desert tortoises outside of the Project site is assumed to be similar to that on the Project site (Table 3.8-1). The average densities do not meet the definition of a "depleted population" identified in the USFWS guidance for distant desert tortoise translocation; however, this alternative includes different types of translocation and the opportunity for desert tortoise to reoccupy 65 percent of the solar facility after construction, which makes it a viable alternative. Translocation would be conducted in accordance with a Biological Opinion, Translocation Plan, and Incidental Take Permits issued by the USFWS. Three types of translocation could occur; short distance translocation, reintroduction, and distant translocation, as described above. Approximately 183

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adult tortoises would be allowed to re-enter the Project site or translocated back into the Project area and 36 adult desert tortoises and an unknown number of juveniles would be distantly translocated.

Direct impacts could occur during the health assessments and the physical movement of desert tortoises. Holding pens (at the Great Basin Institute) would need to be used until the desert tortoises could be reintroduction into the mowed areas of the solar facility after construction. Ultimately, all of the desert tortoises in the holding pens would be reintroduced to the Project site or translocated back into the Project area.

The Hybrid Alternative would reduce the amount of native vegetation removed from 7,097 acres (2,872 hectares) for the Proposed Action to 2,603 acres (1,053 hectares). Maintaining 4,460 acres (1,805 hectares) of vegetation within the solar facility would allow desert tortoises to reoccupy the site, but the habitat would be highly modified and the success of reoccupation is unknown; therefore, this alternative is considered to result in a loss or take of habitat.

The number of tortoises injured or killed (taken) would be reduced compared with the Proposed Action. Ongoing O&M of the solar facility would result in some additional impacts on desert tortoises from mowing and other maintenance activities. Additional desert tortoise protection measures would be required, as identified in the Project-specific Biological Opinion and Incidental Take Permit to reduce effects during O&M.

Indirect Effects

Tortoises moved immediately outside of the site are expected to remain approximately within their home ranges and thus would be familiar with the area and individual tortoises in the area. By contrast, the 36 distant translocatees would be unfamiliar with the release area. As a result, these tortoises may be at an increased risk of predation due to temporary unfamiliarity and may experience increased agonistic encounters with residents. The local density of desert tortoises moved immediately outside of the site would approximately double, temporarily, until home ranges shifted. Resources are expected to be adequate in the short term, but agonistic encounters could increase due to social disruption. These tortoises would be adjacent to construction-related activities for over a year, which could result in unknown levels of stress and behavioral disruption. Only tortoises determined to be healthy and asymptomatic of respiratory disease would be translocated. Even so, there is a minor risk that both translocatees and resident tortoises may be adversely affected due to the spread of diseases.

Other indirect impacts from habitat fragmentation and changes in connectivity would be reduced under the Hybrid Alternative as compared with the Proposed Action, but could still occur. The greater concern with respect to connectivity is limitation on the movement of tortoises from east to west to the North Muddy Mountains due to the long barrier fence along sites B, C, and D for the traditional development areas. This barrier would extend in a north-south direction for approximately 4.7 miles (7.6 kilometers). The desert tortoise exclusion fencing around development areas A, B, and C would be a shorter barrier to connectivity; it would be aligned east to west (limiting north-south movement) and extend for approximately 3.5 miles (5.6 kilometers). The southern end of the fenced area for traditional development is approximately 2.5 miles (4 kilometers) from the Muddy Mountains and would create a pinch-point for tortoise migration past that point moving northeast towards the North Muddy Mountains or moving south. Some reduced gene flow could occur based on tortoise movement restrictions, as could localized increases in densities and stressors that could impact tortoise health and survival. The pinch point would be wider than the 1 mile created under the Proposed Action.

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Several other indirect effects described for the Proposed Action could also occur under the Hybrid Alternative. Night lighting, spread of weeds, crushing of approximately 20 percent of the vegetation in the mowed areas during construction, increased predators (including ravens), and increased runoff of contaminated stormwater from chemicals or herbicides could affect the desert tortoise, as described for the All Mowing Alternative. As stated in Chapter 2: Proposed Action and Alternatives, only herbicides known to have minimal effects on desert tortoise (per Biological Opinion File No. 84320-2010-F-0365.R038) would be allowed in areas where desert tortoise could occupy.

These indirect effects would be addressed through implementation of Project design features and mitigations that control soil erosion, stormwater runoff, and water quality during all phases of the Project. The Applicant would implement the WEAP as well as the Raven Management Plan, Site Restoration Plan, Integrated Weed Management Plan, PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan to reduce indirect adverse effects on desert tortoise.

These indirect effects would be addressed through implementation of Project design features and mitigation that control soil erosion, stormwater runoff, and water quality during all phases of the Project. The Applicant would implement the WEAP, as well as the Raven Management Plan, Site Restoration Plan, Integrated Weed Management Plan, PUP, SWPPP, Stormwater Quality Monitoring Program, SPCC Plan, Health and Safety Plan (including waste management), and Lighting Plan to reduce indirect adverse effects on desert tortoise.

No impacts on the Moapa dace would occur, as with the Proposed Action.

Residual Effects

While some tortoises would be taken under the Hybrid Alternative, the take would be considerably less than under the Proposed Action. Vegetation would be maintained over 65 percent of the solar development areas, but would be mowed, crushed by equipment, and removed during the construction of access roads and solar arrays. Desert tortoise habitat over the entire solar facility acreage of 7,062 (2,858 hectares) would be eliminated, but tortoises could reoccupy up to 65 percent of the site when vegetation returns. However, it is not known whether reoccupation would be successful.

Cumulative Effects

The Hybrid Alternative would result in a similar cumulative loss of desert tortoise habitat from solar projects in the region as described for the Proposed Action. The Hybrid Alternative would make a similar contribution to cumulative impacts as the Proposed Action; however, since desert tortoise would be allowed to reoccupy 65 percent of the site after construction, the Project's contribution to the overall cumulative effects from total removal of available acreage for desert tortoise occupation would be less than that of the Proposed Action. Tortoise take would be reduced compared with the Proposed Action, but any take would contribute to cumulative impacts on the species. Other cumulative impacts would be the same as for the Proposed Action, including impacts on Moapa dace.

No Action Alternative

Under the No Action Alternative, the Project would not be built, and no impacts on threatened, endangered, or candidate species would occur.

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Mitigation Measures

The BLM is in consultation with the USFWS pursuant to Section 7 of the Endangered Species Act regarding the Proposed Action, and a Project-specific Biological Opinion will be issued that includes non-discretionary, reasonable, and prudent measures, terms, and conditions to minimize tortoise take. Additional mitigation is presented below. The Section 7 consultation is underway and the Biological Opinion will be included with the Final EIS, if available at that time.

- MM T&E-1: Dust Palliative Study Funding (from Section 3.8: Threatened, Endangered, and Candidate Species)
- MM WILD-1: Reduced Project Footprint (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-2: Qualified Biologist (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-3: Worker Environmental Awareness Program (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-4: Elimination of Wildlife Hiding Locations (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM WILD-5: Elimination of Conflicts with Wildlife (from Section 3.7: Wildlife, Migratory Birds, and Special Status Species)
- MM VG-1: Requirements of the Site Restoration Plan and Integrated Weed Management Plan (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

3.9 Air Quality and Climate Change

3.9.1 Affected Environment

Introduction

This section addresses the baseline air quality in the Project area. Supplementation information is provided in the *Air Quality and Climate Change Technical Report* (Panorama Environmental, Inc. 2019a). The Project is subject to several laws and regulations, including the Clean Air Act and Clark County Section 94 of the Air Quality Regulations. The laws and regulations that apply to the Project are described in Appendix E.

Analysis Area

Air quality is a regional resource that is neither defined nor limited by jurisdictional boundaries, political boundaries, or project boundaries. The area for the air quality analysis encompasses the hydrographic basins¹² within which the Project site is located, as well as the hydrographic basins within Clark County under the jurisdiction of the Clark County Department of Air Quality (refer to Figure 3.8-1 for a map of the hydrographic basins in the Project area).

GHGs are global pollutants with atmospheric lifetimes of up to several thousand years, which allows their dispersal around the globe (IPCC 2014). The analysis of GHGs does not follow a boundary, but

¹² Hydrographic basins are used as the air quality management unit throughout Nevada because they are based on topography.

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comparisons of non-renewable emissions are focused on California and Nevada, where the electricity generated from the Project would likely be sold.

Baseline Description

Climate

The Project site is located within the southernmost portion of Nevada in the Dry Lake Valley of the southeastern Mojave Desert, which experiences extreme daily temperature fluctuations. Temperatures in the Project area are hottest during summer, particularly in July, with an average peak of 100 to 106 degrees Fahrenheit (38 to 41 degrees Celsius). The winter months are cooler, with temperatures averaging from just above freezing to 64 degrees Fahrenheit (18 degrees Celsius). Annual average precipitation is 4.3 inches (11 centimeters) (WRCC 2016b). Wind speeds in the Project area average approximately 8.6 miles per hour (13.8 kilometers per hour) (refer to Figure 3.8-2 for a wind rose of the Las Vegas McCarran International Airport).

Air Standards

The USEPA has set air pollutant emission standards, referred to as National Ambient Air Quality Standards (NAAQS), to protect public health. NAAQS are defined for six criteria pollutants: ozone (O₃), carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), lead (Pb), and particulate matter (PM). Ozone forms when ozone precursors (i.e., volatile organic compounds [VOCs], CO, and nitrogen oxides [NO_x]) react with sunlight in the atmosphere. PM criteria pollutants are classified as either respirable particulate matter less than 10 micrometers in diameter (PM₁₀) or fine particulate matter less than 2.5 micrometers in diameter (PM_{2.5}). The State of Nevada has adopted federal rules by reference, with some exceptions, and established state ambient air quality standards (SAAQS). The USEPA revoked the annual standard for PM₁₀ on October 17, 2006; however, the State of Nevada has retained this standard and has set an additional air quality standard for hydrogen sulfide (H₂S). Primary ambient air quality standards are the levels of air quality necessary to protect the public health with an adequate margin of safety. Secondary standards are the levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Clark County and the Project site are located within the Las Vegas Intrastate Air Quality Control Region designated by the USEPA (40 § CFR 81.80). Nevada is further divided into hydrographic basins that are used to define local airsheds. The Project site is located within hydrographic basins 218 (Basin 218) and 216 (Basin 216), as shown in Figure 3.8-1.

Air Quality Designations

The USEPA designates attainment status for air quality standards within hydrographic basins. Attainment areas are those that meet or exceed ambient air quality standards, while nonattainment areas are those that do not. States with nonattainment areas are required to draft a plan known as a State Implementation Plan, which includes measures that the state will take to improve air quality. The USEPA will designate the area as in maintenance once the ambient air quality standards and additional redesignation requirements in the Clean Air Act are met (USEPA 2019).

Basin 218, where the majority of the Project lies, and Basin 216, where the gen-tie and Crystal Substation lie, are both designated as unclassified or in attainment for all air pollutants. (USEPA 2018a). The closest nonattainment area is the Los Vegas area, which is designated as in marginal nonattainment for ozone.

Greenhouse Gases

Gases that trap heat in the atmosphere (i.e., GHGs) regulate the earth's temperature. The most common GHGs are carbon dioxide (CO₂) and water vapor. Other critical GHGs include methane (CH₄), nitrous

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oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). GHGs are released into the earth's atmosphere through a variety of natural processes and human activities. GHG emission inventories are measured in units of carbon dioxide equivalent (CO₂e).

An expanding body of scientific research supports the theory that global climate change is currently affecting weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, and that it will increasingly do so in the future. The climate and several naturally occurring resources within the western United States could be adversely affected by global climate change. Mass migration and/or loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in climate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes, fires, and drought; and increased levels of air pollution.

Existing Greenhouse Gas Emissions

GHG emissions in the United States and in the state of Nevada decreased between 2005 and 2013; however, emissions generated within Clark County increased during that time period. Emissions generated within the state of Nevada comprise less than 1 percent of overall emissions in the United States. The majority of emissions in Nevada are generated within Clark County, due to the large population in the Las Vegas metropolitan area and its tourist attractions. Transportation constitutes the greatest source of GHG emissions in Clark County (USEPA 2018b, NDEP 2016, SNRPC 2014).

3.9.2 Environmental Consequences

Introduction

Emissions generated during Project construction were calculated based on the detailed list of equipment and the schedule presented in the POD (Solar Partners, XI, LLC 2019). The General Conformity Rule does not apply to the Project because it is located in an area designated as unclassified or in attainment for all air pollutants. Dispersion modeling of the air emissions generated during construction was conducted to determine the maximum concentrations at receptor locations near the Project site for criteria pollutants. Receptor locations include anywhere that a person could feasibly be, including at the fence line of the Project site and adjacent to the gen-tie lines. Air dispersion modeling of pollutants from the Project site was performed to evaluate compliance with the NAAQS and SAAQS. Concentrations of pollutants were also modeled for the nearest Class I area: Grand Canyon National Park in Arizona, which is located about 55 miles (88.5 kilometers) southeast of the Project site. Refer to the *Gemini Solar Project Air Quality and Climate Change Technical Report* (RCH Group 2018) for additional information.

Proposed Action

Construction

Air Quality. Vehicle and equipment operation during construction would emit diesel particulate matter and other criteria air pollutants. Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM₁₀ and PM_{2.5}. Construction activities, including land clearing through disk and roll and grading, would be sources of fugitive dust. The maximum concentrations of particulate matter would occur at the gen-tie lines, and the maximum concentrations of NO₂ would occur near the well site during construction (if a well is used to source water), as shown in Table 3.9-1.

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The maximum ambient concentrations of PM₁₀, PM_{2.5}, and NO₂ would exceed the NAAQS/SAAQS. Maximum ambient concentrations at the fence lines associated with each solar development area during construction would generally be slightly lower than the ambient concentrations near the gen-tie line construction. The maximum ambient concentrations at the fence lines around the development areas, however, would also exceed NAAQS/SAAQS for PM₁₀ and PM_{2.5}. An adverse effect on local air quality from fugitive dust emissions (both PM₁₀ and PM_{2.5}) would occur. Preparation of a Dust Control and Air Quality Plan would be required prior to construction, and this plan would be implemented during construction. The Project would be required to obtain a dust control permit from the Clark County Department of Air Quality and to implement the required conditions. MM AQ-1 requires the Dust Control and Air Quality Plan to include several fugitive dust and equipment controls to be implemented during construction. The maximum ambient concentrations for all pollutants and averaging periods, except for the 1-hour NO₂, would be reduced to less than the NAAQS/SAAQS, with implementation of this mitigation measure, as shown in Table 3.9-2. The 1-hour NO₂ would exceed the standards even with mitigation at the fence line near the well, resulting in an adverse effect. If water were sourced from the Moapa Paiute Travel Plaza wells, or via water trucks, instead of via an on-site well, ambient concentrations of all criteria pollutants would be marginally less and NO₂ concentrations would not exceed NAAQS/SAAQs with mitigation.

The maximum ambient concentrations for all pollutants and averaging periods at Grand Canyon National Park are less than 55 percent of the NAAQS/SAAQS. Modeled ambient concentrations resulting from the Project are all shown to be between <0.01 and 2.06 micrograms per cubic meter (µg/m³) at the Grand Canyon (where NAAQS/SAAQS range from 12 to 40,000 µg/m³) (BLM 2017). No adverse effect or significant deterioration would occur at Grand Canyon National Park.

Climate Change. Construction of the Proposed Action would result in emissions of 73,886 to 125,724 metric tons of CO₂e, or a maximum of 40,183 to 66,336 metric tons of CO₂e in a single year, depending upon the source of water (RCH Group 2018). These emissions would contribute cumulatively to global annual GHG emissions, which were estimated at 49.3 gigatons¹³ of CO₂e in 2016 (Olivier, Schure and Peters 2017). Global GHG emissions have continued to increase over many decades. Per the USEPA's GHG Equivalencies Calculator, the maximum amount of GHG emissions generated in a single year during construction of the Proposed Action would be the same amount as that produced by 4,424 to 7,527 households from energy consumption (USEPA 2018c). Cumulative GHG emissions have been linked to accelerated global climate change. A one-time generation of GHG emissions from the Proposed Action would be required to construct the facility. Construction would contribute CO₂e over a short period of time (2 years¹⁴). Climate change is a long-term phenomenon. While the Project would result in high level of emissions for a short time, those emissions would be offset by the operational benefits of solar power (see below) and would not be adverse.

Operation and Maintenance

Air Quality. Worker vehicles traveling to and from the site and those conducting maintenance activities would emit some pollutants. Some emissions from the testing and use of generators could occur but would be minimal. Operation of the Project would involve the disturbance of approximately 7,100 acres (2,873 hectares) of land. Some portions of the Project site would be paved with concrete or soil cement, such as the substations and the proposed drainage channel on the west side of development area B;

¹³ 1 gigaton is 1 billion metric tons

¹⁴ For this analysis, the calculations conservatively used a construction period of 2 years, although construction is expected to occur for 28 months.

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however, the majority of the Project site would be unvegetated bare soil. Wind events could disturb soils on the Project site, resulting in erosion and fugitive dust. Annual emissions of fugitive dust were calculated for the Project, given complete vegetation clearing of the site, as shown in Table 3.9-3.

Dust can dramatically affect the energy output of solar cells. Studies in the United States have found losses of 5 to 23 percent, depending on the type of dust and angle of solar panel surface (Maghami, et al. 2016). In addition to panel cleaning, dust controls (such as watering and applying regulation-compliant palliatives) are commonly used throughout active solar fields to minimize output losses. Fugitive dust controls during operation would be required as part of the Dust Control and Air Quality Plan and per MM AQ-1, which would minimize emissions substantially, as shown in Table 3.9-3 (with mitigation). Impacts would not be adverse.

Climate Change. Operation of the Project would generate minimal GHG emissions. As shown in Table 3.9-4, the Project would offset a significant quantity of GHG emissions compared to the equivalent GHG emissions from energy generated at a non-renewable power plant. Potential air emissions offset by the Project would be much higher than the air emissions generated by Project operations (or construction). Compared to non-renewable energy generation, the Project would be beneficial with respect to GHG emissions.

Decommissioning

Decommissioning activities would be similar to construction activities, but would occur on a more limited scale and for a shorter duration. The potential effects of decommissioning on ambient air quality and climate change would be correspondingly smaller than the effects from construction activities. Associated effects on ambient air quality would be temporary. An adverse effect on local air quality from fugitive dust emissions and climate change from GHG emissions could occur. MM AQ-1, which requires the Dust Control and Air Quality Plan to include a number of fugitive dust and equipment controls, would minimize emissions. A short-term adverse effect on ambient air quality at the gen-tie lines could still occur. The GHG emissions generated during decommissioning would be offset by the beneficial effects achieved throughout the lifetime of the Project. Following decommissioning, areas of bare soil could continue to contribute fugitive dust for many years. A Site Restoration Plan would include restoration and revegetation measures. Implementation of the plan would restore areas to pre-construction conditions. The Site Restoration Plan would include restoration measures at the Project site until all success criteria were met. Decommissioning would return the area to its pre-construction, natural condition over time.

Residual Effects

Implementation of the mitigation measure would reduce potential adverse effects from air emissions generated during construction and decommissioning. Residual effects from concentrations of NO₂ exceeding NAAQS/SAAQS (on-site well option only) and GHG emissions (all options) would remain. No residual ambient concentration effects would occur if water were sourced from the Moapa Pipeline or trucked to the site. Implementation of the mitigation measures would not be expected to result in any other effects.

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Table 3.9-1 Estimated Maximum Ambient Concentrations of Criteria Air Pollutants from the Proposed Action Unmitigated – Well Option

Criteria	CO		NO ₂		SO ₂		PM ₁₀		PM _{2.5}	
	1-Hr	8-Hr	1-Hr	Annual	1-Hr	3-Hr	24-Hr	Annual	24-Hr	Annual
Maximum Modeled Concentration (µg/m ³)	191.0	73.0	119.5	4.33	102.1	77.2	223.4	73.3	25.2	8.79
Background Concentration (µg/m ³)	3,048	2,296	102	29.7	15.9	15.5	96.0	26.9	24.2	9.30
Total Concentration (µg/m ³)	3,239	2,369	221.5	34.0	118.0	92.7	319.4	100.2	49.4	18.1
NAAQS/SAAQS	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	8.1	23.7	117.8	34.0	60.2	7.1	212.9	200.5	141.2	150.7
Exceed NAAQS/SAAQS (Yes/No)?	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes

Table 3.9-2 Estimated Maximum Ambient Concentrations of Criteria Air Pollutants from the Proposed Action with Mitigated – Well Option

Criteria	CO		NO ₂		SO ₂		PM ₁₀		PM _{2.5}	
	1-Hr	8-Hr	1-Hr	Annual	1-Hr	3-Hr	24-Hr	Annual	24-Hr	Annual
Maximum Modeled Concentration (µg/m ³)	191.0	73.0	119.5	4.33	102.1	77.2	45.9	15.1	5.89	2.05
Background Concentration (µg/m ³)	3,048	2,296	102	29.7	15.9	15.5	96.0	26.9	24.2	9.30
Total Concentration (µg/m ³)	3,239	2,369	221.5	34.0	118.0	92.7	142	42.0	30.1	11.3
NAAQS/SAAQS	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	8.1	23.7	117.8	34.0	60.2	7.1	94.6	83.9	86.0	94.6
Exceed NAAQS/SAAQS (Yes/No)?	No	No	Yes	No	No	No	No	No	No	No

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Table 3.9-3 Proposed Action Operational Emissions Offset (tons per year)

Emission Source	VOC	SO₂	CO	NO_x	PM₁₀	PM_{2.5}
Unmitigated						
Worker Vehicles	0.11	minimal	1.15	0.17	0.06	0.01
Fugitive Dust	-	-	-	-	6,379.13	956.87
Water Trucks (Trucking Only)	-/-/0.15	minimal	-/-/0.51	-/-/1.23	-/-/0.07	-/-/0.02
Pumps/Generators (Moapa Pipeline/Well/Trucking)	0.02/0.09/0.02	0.20/0.81/0.20	0.29/1.15/0.29	0.31/1.24/ 0.31	0.02/0.07/0.02	0.02/0.07/0.02
Total (Moapa Pipeline/Well/Trucking)	0.13/0.20/0.28	0.20/0.81/0.20	1.44/2.30/1.95	0.48/1.41/ 1.71	6,379	957
Total Equivalent Emissions Generated for 690-MW Non-Renewable Energy	-	103.77	-	576.57	-	-
Emissions Offset (Moapa Pipeline/Well/Trucking)	-	~103	-	576.09/575.16/574.86	-	-
Mitigated						
Worker Vehicles	0.11	minimal	1.15	0.17	0.06	0.01
Fugitive Dust	-	-	-	-	-490.53 ^a	-73.58
Water Trucks (Trucking Only)	-/-/0.15	minimal	-/-/0.51	-/-/1.23	-/-/0.07	-/-/0.02
Pumps/Generators (Moapa Pipeline/Well/Trucking)	0.02/0.09/0.02	0.20/0.81/0.20	0.29/1.15/0.29	0.31/1.24/0.31	0.02/0.07/0.02	0.02/0.07/0.02
Total (Moapa Pipeline/Well/Trucking)	0.13/0.20/0.28	0.20/0.81/0.20	1.44/2.30/1.95	0.48/1.41/1.71	-490.5	-73.5
Total Equivalent Emissions Generated for 690-MW Non-Renewable Energy	-	103.77	-	576.57	-	-
Emissions Offset (Moapa Pipeline/Well/Trucking)	-	~103	-	576.09/575.16/574.86	490.5	73.5
Negative values for fugitive dust are achieved as the dust controls can often reduce dust generation below levels that would occur without the solar facility. Vegetation cover is sparse under existing conditions, so dust is naturally generated during windy conditions.						

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Table 3.9-4 Proposed Action Operational Emissions Offset Over the Life of the Project (Metric Tons CO₂e)

Emission Source	Moapa Pipeline Option	Well Option	Trucking Option
Proposed Action – Construction	73,886	80,954	125,724
Proposed Action Operation	28,076	28,253	28,599
Total	101,962	109,207	154,323
Total Equivalent Emissions Generated for 690-MW Non-Renewable Energy Over Life of the Project	19,378,945	19,378,945	19,378,945
GHG Emissions Offset over Life of Project	19,276,983	19,269,738	19,224,622

Cumulative Effects

The Las Vegas area is designated as being in marginal nonattainment for ozone and in maintenance for CO and PM₁₀. Many cumulative projects in Clark County could be constructed simultaneously, potentially resulting in a substantial cumulative effect on regional air quality and global GHG emissions. The maximum concentrations of air pollutants from the Proposed Action in combination with background concentrations of pollutants could exceed the respective NAAQS/SAAQS during construction, as previously discussed. The Proposed Action and other renewable energy projects would have beneficial operational impacts with respect to both criteria pollutant and GHG emissions because they would replace emissions associated with fossil fuel-fired power plants. High particulate concentrations would be limited to the vicinity of the construction activities and would disperse with distance. As such, the contribution of particulate emissions from cumulative projects would be primarily from those in close proximity. Compliance with the Dust Control and Air Quality Plan and MM AQ-1 would minimize the Proposed Action's contribution to pollutant concentrations.

All Mowing Alternative

Construction

Air Quality. The maximum ambient concentrations of pollutants would occur at the gen-tie lines during construction for the All Mowing Alternatives, similar to the Proposed Action. Resultant unmitigated ambient pollutant concentrations would be very similar to those shown for the Proposed Action in Table 3.9-1. PM₁₀ and PM_{2.5} concentrations at the gen-tie lines and solar array development area fence lines and concentrations of NO₂ at the fence line near the well would exceed NAAQS/SAAQS. MM AQ-1 would be implemented to minimize emissions. The maximum concentrations for all pollutants and averaging periods, except for 24-hour PM₁₀ and 1-hour NO₂, would be less than the NAAQS/SAAQS with emissions controls. Table 3.9-5 presents the ambient pollutant concentrations with mitigation for the All Mowing Alternative.

An adverse effect on local air quality from PM₁₀ at the gen-tie lines and NO₂ at the fence line near the well could still occur, even with mitigation. PM₁₀ emissions would be higher for the alternatives than for the Proposed Action primarily due to the increased labor and equipment needed to construct mowed areas as compared with areas developed using traditional methods. Compliance with the Dust Control and Air Quality Plan and MM AQ-1 would minimize the Project's contribution to pollutant emissions in the region.

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3.9 Air Quality and Climate Change

Climate Change. Construction of the All Mowing Alternative would generate slightly more GHG emissions than the Proposed Action, between 81,082 and 133,211 metric tons of CO₂e, as mowed areas require more labor and/or equipment to construct, which results in more pollutant emissions. As with the Proposed Action, these one-time emissions are significantly less than even a single year of equivalent energy production using non-renewable resources, and much less over the life of any of the All Mowing Alternatives. Compared to non-renewable energy generation, the alternative would be beneficial with respect to GHG emissions.

Operation and Maintenance

Emissions generated during O&M of the All Mowing Alternative would be similar to the Proposed Action and would be substantially less than emissions generated by a non-renewable power plant producing an equivalent amount of energy over the life of the alternative. The All Mowing Alternative would require maintenance of the vegetation over the lifetime of the Project, although vegetation trimming would occur only a few times over the 30-year life of the Project. Most vegetation is naturally less than 24 inches in height. Emissions from equipment used to maintain vegetation would be similar to the emissions from equipment needed to address herbicides and noxious weed control for the Proposed Action. Fugitive dust released from the Project site during operation would vary between the Proposed Action and the All Mowing Alternative, as shown in Table 3.9-6. Compared to non-renewable energy generation, the alternative would be beneficial with respect to GHG emissions.

Decommissioning

Decommissioning activities would be similar to construction activities. An adverse effect on local air quality from fugitive dust emissions would occur. MM AQ-1, which requires the Dust Control and Air Quality Plan to include a number of fugitive dust and equipment controls, would minimize emissions.

A short-term adverse effect on ambient air quality at the gen-tie lines could still occur. The GHG emissions generated during decommissioning would be offset by the beneficial effects achieved throughout the lifetime of the alternative.

Residual Effects

Residual effects from concentrations of PM₁₀ and NO₂ exceeding NAAQS/SAAQS (on-site well option only) and GHG emissions (all options) would remain. No residual ambient concentration effects would occur if water were sourced from the Moapa Pipeline or trucked to the site. Implementation of the mitigation measures would not be expected to result in any other effects.

Cumulative Effects

Emissions from other projects would be as described under the cumulative effects discussion for the Proposed Action and could be adverse for particulate and NO₂ emissions. Cumulative impacts related to GHG emissions would be the same as for the Proposed Action. Compliance with the Dust Control and Air Quality Plan and MM AQ-1 would minimize the Proposed Action's contribution to pollutant concentrations.

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3.9 Air Quality and Climate Change

Table 3.9-5 Estimated Maximum Ambient Concentrations of Criteria Air Pollutants from the All Mowing Alternative Mitigated – Well Option

Criteria	CO		NO ₂		SO ₂		PM ₁₀		PM _{2.5}	
	1-Hr	8-Hr	1-Hr	Annual	1-Hr	3-Hr	24-Hr	Annual	24-Hr	Annual
Total Concentration (µg/m ³)	3,336	2,367	213.4	35.3	110.1	97.2	158	45.7	31.6	11.9
NAAQS/SAAQS	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	8.3	23.7	113.5	35.3	56.2	7.5	105.2	91.5	90.2	98.9
Exceed NAAQS/SAAQS (Yes/No)?	No	No	Yes	No	No	No	Yes	No	No	No

Table 3.9-6 Comparison of Fugitive Dust Between Alternatives (tons per year)

Net Fugitive Dust	Proposed Action	All Mowing Alternative
Unmitigated		
PM ₁₀	6,379.13	2,480.71
PM _{2.5}	956.87	372.11
Mitigated		
PM ₁₀	-490.53	-1,753.21
PM _{2.5}	-279.67	-262.98
Notes: Negative values for fugitive dust are achieved as the dust controls can often reduce dust generation below levels that would occur without the solar facility. Vegetation cover is sparse under existing conditions, so dust is naturally generated during windy conditions.		

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Hybrid Alternative

Construction

Air Quality. The maximum ambient concentrations of pollutants would occur at the gen-tie lines during construction for the Hybrid Alternative, similar to the Proposed Action. Resultant unmitigated ambient pollutant concentrations would be very similar to those shown for the Proposed Action in Table 3.9-1. Similar to the All Mowing Alternative, PM₁₀ and PM_{2.5} concentrations at the gen-tie lines and solar array development area fence lines and concentrations of NO₂ at the fence line near the well would exceed NAAQS/SAAQS. MM AQ-1 would be implemented to minimize emissions. The maximum concentrations for all pollutants and averaging periods, except for 24-hour PM₁₀ and 1-hour NO₂, would be less than the NAAQS/SAAQS with emissions controls. Table 3.9-7 provides the ambient pollutant concentrations with mitigation for the Hybrid Alternative. Adverse effects on local air quality from PM₁₀ and NO₂ would be the same as described for the All Mowing Alternative. Cumulative effects would be the same as described for the All Mowing Alternative. Compliance with the Dust Control and Air Quality Plan and MM AQ-1 would minimize the Project's contribution to pollutant emissions in the region.

Climate Change. Construction of the Hybrid Alternative would generate slightly more GHG emissions than the Proposed Action, between 78,464 and 130,302 metric tons of CO₂e, as mowed areas require more labor and/or equipment to construct, resulting in more pollutant emissions. Cumulative impacts would be the same as for the Proposed Action. As with the Proposed Action, these one-time emissions are significantly less than even a single year of equivalent energy production using non-renewable resources, and much less over the life of any of the alternatives. Compared to non-renewable energy generation, the alternative would be beneficial with respect to GHG emissions.

Operation and Maintenance

Emissions generated during O&M of the Hybrid Alternative would be similar to the All Mowing Alternative. The Hybrid Alternative would require the same maintenance of vegetation and associated emissions as described for the All Mowing Alternative. Fugitive dust released from the Project site during operation would vary between the Proposed Action and the Hybrid Alternative, as shown in Table 3.9-8. Compared to non-renewable energy generation, the alternative would be beneficial with respect to GHG emissions.

Decommissioning

Effects related to decommissioning activities would be the same as described for the All Mowing Alternative, and the same mitigation would be implemented. The GHG emissions generated during decommissioning would be offset by the beneficial effects achieved throughout the lifetime of the alternative.

Residual Effects

Residual effects would be the same as described for the All Mowing Alternative.

Cumulative Effects

Cumulative effects would be the same as described for the All Mowing Alternative.

No Action Alternative

The Project would not be built under the No Action Alternative. No air emissions nor exceedances of NAAQS/SAAQS would occur. No adverse effect would occur.

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3.9 Air Quality and Climate Change

Table 3.9-7 Estimated Maximum Ambient Concentrations of Criteria Air Pollutants from the Hybrid Alternative Mitigated – Well Option

Criteria	CO		NO ₂		SO ₂		PM ₁₀		PM _{2.5}	
	1-Hr	8-Hr	1-Hr	Annual	1-Hr	3-Hr	24-Hr	Annual	24-Hr	Annual
Total Concentration (µg/m ³)	3,340	2,369	222.1	34.1	118.1	92.7	158	45.7	31.6	11.9
NAAQS/SAAQS	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	8.3	23.7	118.1	34.1	60.2	7.1	105.3	91.4	90.2	98.8
Exceed NAAQS/SAAQS (Yes/No)?	No	No	Yes	No	No	No	Yes	No	No	No

Table 3.9-8 Comparison of Fugitive Dust Between for Hybrid Alternative (tons per year)

Net Fugitive Dust	Proposed Action	Hybrid Alternative
Unmitigated		
PM ₁₀	6,379.13	3,768.25
PM _{2.5}	956.87	565.24
Mitigated		
PM ₁₀	-490.53	-1,256.65
PM _{2.5}	-279.67	-188.50
Notes: Negative values for fugitive dust are achieved as the dust controls can often reduce dust generation below levels that would occur without the solar facility. Vegetation cover is sparse under existing conditions, so dust is naturally generated during windy conditions.		

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3.9 Air Quality and Climate Change

Mitigation Measures

- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

3.10 Visual Resources

3.10.1 Affected Environment

Introduction

This section is based on information provided in the *Visual Resources Technical Report Gemini Solar Project* and *Glint and Glare Study for the Gemini Solar Project* (Panorama Environmental, Inc. 2019c, Panorama Environmental, Inc. 2019i). Additional details are available in these studies. Refer to Section 3.14: Old Spanish National Historic Trail for regulations and baseline information related to the OSNHT.

The FLPMA provides for the management and protection of public lands, including their scenic quality. ROW grants on federal lands must contain terms and conditions that would minimize damage to scenic quality and aesthetic values (Section 505a). The BLM manages land under its jurisdiction according to the goals and policies outlined in their RMPs; the 1998 Las Vegas RMP is the applicable plan for the Gemini Solar Project. The 1998 Las Vegas RMP identifies the components of the VRM system that apply to lands within the Las Vegas district. The VRM system provides a means to identify visual values, establish objectives through the RMP process for managing these values, and provide timely inputs into proposed surface-disturbing projects to ensure that these objectives are met.

The Project area is within VRM Class III because of the cultural, historic, and natural features and settings within the area, including the OSNHT corridor, Muddy Mountain Wilderness Area, and BSBCB. The objective of VRM Class III is to partially retain the existing landscape character, and as such the level of visual change in VRM Class III areas should be moderate. Management activities may attract attention but should not dominate the casual observer's view of the area. Visual changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The Visual Resource Inventory (VRI) is a process for determining visual (scenic) values in a management area at a specific point in time and follows the guidelines in BLM Manual Handbook H-8410-1, Visual Resource Inventory (BLM 1986b). Three primary components comprise a visual resource inventory: (1) scenic quality evaluation, (2) sensitivity level analysis, and (3) delineation of distance zones. Landscapes are then given a VRI class based on the inventory. BLM-administered lands are placed into one of four VRI classes, which represent the relative value of the visual resources. Classes I and II are the most valued; Class III represents a moderate value; and Class IV represents the least value (BLM 1986b). The Project is located primarily in VRI Class III (moderate value), while a portion of the proposed gen-tie is in VRI Class IV (least value) (Otak, Inc. 2011). VRI classes do not direct management but provide information to the BLM when making management decisions. The VRI contains the baseline data for assessing impacts on the existing landscape character.

Data Sources and Methodology

A comprehensive viewshed analysis was conducted for the Project to identify areas that may offer views of Project facilities. The combined viewshed for the Project within 25 miles (40 kilometers) is shown on Figure 3.10-1. The viewshed includes all surrounding points that are within the Project's line-of-sight and excludes points that are beyond the horizon or obstructed by landscape elements such as topography.

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3.10 Visual Resources

KOPs are critical viewpoints that are sensitive to visual change because of the type of user, level of use, or their orientation to the project. The BLM guidelines for selecting KOPs stress commonly traveled routes or other likely observation points (BLM Manual 8434). KOPs are identified based on the experience and response of viewers. A total of 40 candidate KOPs (cKOPs) were investigated during photographic surveys conducted in April and August 2018 and February 2019 (Figure 3.10-2). The cKOPs were then screened based on a numeric assessment of key factors, including viewer sensitivity, scenic quality, and the number of viewers, among others. Fifteen KOPs were selected for analysis (Figure 3.10-3), which included creating visual simulations, following the procedures in BLM Handbook H-8431-1, Visual Resource Contrast Rating. The methods utilized for the field investigations, cKOP selection, KOP selection, scenic quality rating, and viewer sensitivity rating followed BLM Manual 8431, as described in the *Visual Resources Technical Report for the Gemini Solar Project*.

Analysis Area

The area of analysis for visual resources is the Project's visual sphere of influence (VSOI), which is the extent to which the Project could visually degrade the visible landscape.¹⁵ The threshold for VSOI is the viewshed within approximately 15 miles (24 kilometers) from the Project area; however, potential adverse effects on visual resources were considered within 25 miles (40 kilometers) of the Project area (Figure 3.10-1).

Baseline Description

Visual Environment

Natural Landscape and Built Environment. The Project site is in a broad valley between the Muddy Mountains to the east and southwest, Dry Lake Range to the west, and the Arrow Canyon Range to the north. The valley reaches a pinch-point approximately 17 miles (27 kilometers) north at Glendale near the confluence of the California Wash with the Muddy River. I-15 traverses the valley north of the Project in a northeast-southwest direction. The landscape unit (i.e., the valley) is visually contained between the surrounding topographic features and has little visibility outside of the valley itself. To the south, the valley grades into the Gale Hills north of Nellis AFB. Representative photographs of the existing landscape are shown in Figure 3.10-4.

Human development within the valley includes I-15, transmission lines, the Moapa Paiute Travel Plaza, Valley of Fire Road, and the Moapa Solar Project, an approximately 2,000-acre (809-hectare), 250-MW solar facility built in 2014. No residential or commercial development (except for the Moapa Paiute Travel Plaza) is located in the Project area.

Detailed descriptions of the visual conditions at cKOPs are provided in the *Visual Resources Technical Report for the Gemini Solar Project*. Existing visual conditions for the 15 selected KOPs are shown on Figures 3.10-5 to 3.10-19. The selected KOPs present representative views that motorists, recreationalists, and recreational motorists (e.g., OHV users) would have of the Project site. KOPs are located on I-15, Valley of Fire Road, the California Wash (for its recreational use in the Project area), BSBCB, Old Spanish Trail Road, Arrowhead Trail, Colorock Quarry Road, Valley of Fire Road, an unnamed road, and two recreation staging areas.

¹⁵ VSOI is a similar concept as viewshed but takes other environmental and qualitative factors into consideration that are not addressed in the viewshed model, such as the presence of intervening topography, vegetation, or structures that may obstruct considerable views; the amount of or perceptibility of the project that may be visible from a location; and viewing angles or atmospheric conditions that would limit viewing distance thresholds.

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3.10 Visual Resources

Scenic Quality. In 2011, the BLM conducted a VRI of the Southern Nevada District Office planning area in preparation for revising the 1998 Las Vegas RMP (Otak, Inc. 2011). The Scenic Quality Rating Units (SQRU) in the Project area are SQRU 035 for the California Wash and SQRU 037 for Dry Lake Valley.¹⁶ The inventory provides a scenic quality rating score of 8.5 for SQRU 035 and 5.5 for SQRU 037 and identifies the scenic quality of the Project area and surrounding landscape as Class C, which is defined as landscapes with features that are common to the region. SQRU 035 included a cultural modification rating of -1, which means cultural modifications have been made that are discordant with the natural setting, in this case due to the presence of altered dunes for OHV use in this unit. SQRU 037 received a cultural modification rating of -1.5 due to the presence of power lines, roads, and signs that are also discordant with the surrounding environment.

During the field investigations, Panorama verified the 2011 VRI through observation to determine whether or not the scenic quality had changed based on any changes in the landscape. Cultural modifications have been made since the BLM's VRI inventory (Otak, Inc. 2011), as noted by field investigators for the Project, with the Moapa Solar Project—which had not been built at the time of the 2011 inventory—visible in the landscape. Field personnel completed scenic quality inventory forms (BLM Form 8400-1) for the 15 KOPs, and the results ranged from 7 to 10, which is consistent with the Class C rating from 2011. The completed forms are provided in the *Visual Resources Technical Report for the Gemini Solar Project*.

Viewer Sensitivity. Viewer sensitivity is a factor used to represent the value of the visual landscape to the viewing public, including the extent to which the landscape is visible. The BLM's VRI assigns high, medium, and low sensitivity based on the consideration of types of users, amount of use, public interest, adjacent land uses, special areas, and other factors. The Sensitivity Level Rating Units (SLRU) in the Project area are SLRU 045 for the Old Spanish Trail (Las Vegas to Mesquite) and SLRU 046 for I-15 – Las Vegas to Glendale.¹⁷ SLRU 045 has a high sensitivity rating because the OSNHT corridor is an important remnant of America's history. SLRU 046 has a medium sensitivity rating because this area falls within a transportation corridor and a portion of Dry Lake Valley that has been heavily developed for industry. Viewer sensitivity has not changed since the BLM VRI inventory.

Viewshed and Distance Zones. A viewshed is the geographical area that is visible from a location. The Project viewshed is shown on Figure 3.10-1. Viewing distance has a substantial effect on whether features in a landscape are noticeable and how prominent they appear. The BLM guidelines for VRM and VRI employ three general distance zones and terms to describe and evaluate visual conditions: foreground-middleground (0 to 5 miles [0 to 8 kilometers]); background (5 to 15 miles [8 to 24 kilometers]); and seldom seen (greater than 15 miles [24 kilometers]). The Project is located in a valley that is visually contained within the surrounding mountain ranges, as previously described. The results of the field investigation and photographic survey indicated noticeable views of the Project site from cKOPs are generally limited to the foreground-middleground zones, except for a few views in the background zone. Of the 15 KOPs, 13 represent foreground-middleground views (KOPs 8, 9, 11, 14, 15, 19, 24, 32, 33, 34, 37, 39, and 40), and two represent background views (KOPs 4 and 38).

¹⁶ The only component of the Project that falls within SQRU 037, Dry Lake Valley, is the gen-tie lines on the west side of I-15.

¹⁷ The only component of the Project that falls within SLRU 046, I-15 – Las Vegas to Glendale, is the gen-tie lines on the west side of I-15.

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3.10 Visual Resources

Glint and Glare

Glint and glare may occur when direct normal irradiance (sunlight) reflects off a surface and a viewer is exposed to it. Glint, also referred to as specular reflection, is a momentary flash of light produced as a direct reflection of the sun in the surface of an object, such as a PV solar panel. Glare is a continuous source of brightness relative to the ambient lighting. Glare is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint. Extreme glint and glare have the potential to cause permanent eye damage (retinal burn) or result in an after-image¹⁸ that could distract or temporarily blind viewers depending on the intensity and duration of exposure. Glint and glare can also pose a hazard to motorists and aircraft pilots.

Glint and glare from PV solar panels would depend on the type of panels, rotation axis and tilt angle, screening elements, and other factors. The intensity of the glare produced by reflective surfaces varies depending on the type of surface. “Albedo” is a term used to quantify the way in which surfaces reflect direct normal irradiance. Solar panels have a very low albedo, similar to water. Glare from solar panels, as with water, is most likely to occur after sunrise and before sunset. However, advancements in solar panels have increased the absorption of incident radiation. The solar cells may have a geometric texture or be treated with anti-reflection coatings to diffuse the incident rays, thereby reducing the intensity of the reflected ray.

3.10.2 Environmental Consequences

Analysis Methods and Criteria for Assessing Level of Impact

The methodology for preparing visual simulations and evaluating visual impacts (e.g., scenic quality and impacts on viewers) is detailed in the *Visual Resources Technical Report for the Gemini Solar Project*. Visual simulations were prepared for the 15 KOPs analyzed in this EIS and are shown in Figures 3.10-20 through 3.10-58. The simulations depict visual conditions after construction of the Proposed Action, the Hybrid Alternative, and the All Mowing Alternative. Simulations for the Proposed Action and the Hybrid Alternative are shown together because these alternatives would utilize similar Project development areas; any visual differences resulting from retained vegetation under the solar arrays would be minor and unnoticeable.

The BLM uses a visual contrast rating system to analyze potential visual impacts of proposed projects and activities. The rating system provides a process for determining the degree to which a management or other authorized activity would affect the visual quality of a landscape by measuring the visual contrast created between a project and the existing landscape. Contrast can be measured by comparing the project features with the major features in the existing landscape. BLM Manual 8431, Visual Resource Contrast Rating, defines procedures for this process (BLM 1986a). Sections C and D of the Visual Contrast Rating Worksheets (BLM Form 8400-4) were completed using visual simulations for the Proposed Action, and the degree of contrast was determined. Completed Visual Contrast Rating Worksheets are provided in Appendix F. The criteria for determining the degree of contrast followed BLM Manual 8431, Visual Resource Contrast Rating, as follows (BLM 1986a):

- **None.** The element contrast is not visible or perceived.
- **Weak.** The element contrast can be seen but does not attract attention.
- **Moderate.** The element contrast begins to attract attention and to dominate the characteristic landscape.

¹⁸ An after-image is when a flash of light prints a lingering image in the viewer’s eye.

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- **Strong.** The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

The following contrast rating factors were considered when applying the degree of contrast criteria, as specified in BLM Manual 8431:

- **Distance Zones.** The contrast created by a project usually is less as viewing distance increases.
- **Angle of Observation.** The apparent size of a project is directly related to the angle between the viewer's line-of-sight and the slope upon which the project is to take place. As this angle nears 90 degrees (vertical and horizontal), the maximum area is viewable.
- **Length of Viewing Time.** If the viewer has only a brief glimpse of the project, the contrast may not be of great concern. If, however, the project is subject to view for a long period, as from an overlook, the contrast may be very significant.
- **Relative Size or Scale.** The contrast created by the project is directly related to its size and scale as compared to the surroundings in which it is placed.
- **Season of Use.** Contrast ratings should consider the physical conditions that exist during the heaviest or most critical visitor use season, such as snow cover and tree defoliation during the winter, leaf color in the fall, and lush vegetation and flowering in the spring.
- **Light Conditions and Atmospheric Conditions.** The amount of contrast can be substantially affected by the light conditions and atmospheric conditions. The direction and angle of lighting can affect color intensity, reflection, shadow, form, texture, and many other visual aspects of the landscape. Light conditions must be a consideration in contrast ratings. Atmospheric conditions can affect contrast.
- **Recovery Time.** The amount of time required for successful revegetation should be considered. Few projects meet the VRM management objectives during construction activities. Recovery usually takes several years and goes through several phases. It may be necessary to conduct contrast ratings for each of the phases that extend over long time periods. Those conducting contrast rating should verify the probability and timing of vegetative recovery.
- **Spatial Relationships.** The relationship of the facility with surrounding features.
- **Motion.** The solar arrays and other project features would be seen as static. The most visually attracting motion is traffic along I-15 and Valley of Fire Road.

GlareGauge, a product of ForgeSolar, is a comprehensive solar glare analysis tool used to conduct the modeling of glint and glare at each designated observation point. A total of 30 observation points comprised of selected cKOPs and other representative views were modeled for glint and glare conditions resulting from the Proposed Action and the alternatives (shown on Figure 3.10-59). Model input parameters were selected to determine worst-case glint and glare conditions for the Project (greatest potential reflectivity and range characteristics) and assumed solar panels could be installed at any location within the entire Project study area. A glint and glare hazard could occur if reflected light had the potential to cause an after-image or permanent eye damage (retinal burn). The observation points, modeling methodology, and input parameters are documented in the *Glint and Glare Study for the Gemini Solar Project* (Panorama Environmental, Inc. 2019c).

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3.10 Visual Resources

Proposed Action

Visual Environment

Construction. *Scenic Quality, Viewers, and BLM Management Objectives.* Construction of the Proposed Action would cause temporary visual impacts during installation of the Project solar facilities and ancillary systems, such as the solar arrays, battery storage systems and inverters, substations, gen-tie lines, collector system, perimeter fences, access roads, O&M facilities, ponds, and well or water pipelines. Visual impacts during construction would occur from site development and the visibility of construction equipment, materials, wastes and debris, erosion, and dust. Based on the results of the contrast rating (refer to Table 3.10-1), it is assumed construction would result in moderate to weak contrast in the foreground-middleground of views from I-15 and Valley of Fire Road and weak contrast everywhere else. Moderate contrast during construction would be compatible with VRM Class III management objectives, except for construction of the gen-tie lines, where strong contrast from I-15 would be visible. Implementation of MM VG-1 from Section 3.6: Vegetation and Jurisdictional Waters, would reduce but not eliminate adverse visual effects from construction through preservation of existing rocks, vegetation, and drainage patterns, to the extent feasible. MM VR-5 would reduce some adverse visual effects during construction by minimizing surface disturbance; appropriately contouring graded areas; and appropriately managing construction wastes, debris, erosion, and dust. The visual impacts of construction would remain adverse but would be temporary.

Nighttime Lighting. Nighttime construction activities would require illumination to meet state and federal worker safety requirements. Nighttime construction lighting could deteriorate stargazing and night sky observation conditions for recreationalists and motorists in the Project vicinity. To the extent possible, nighttime construction lighting would be limited to active work areas and when necessary for safety and security and would be directed downward and shielded from public view. MM VR-3 would further reduce impacts from nighttime lighting by requiring the development and implementation of a Lighting Plan.

Operation and Maintenance. *Overview.* O&M for the Proposed Action would cause impacts on the visual environment similar to those discussed for construction, except impacts would occur for the life of the Project. Project facilities would result in visual contrast with the existing landscape associated with form, line, color, and texture. The overall contrast levels at each KOP are listed in Table 3.10-1. Specific contrast criteria are identified in the contrast rating forms available in Appendix F. The results are summarized below.

The Proposed Action would result in strong contrast where facilities would be visible in the foreground-middleground (within 0.1 to 0.2 mile [0.2 to 0.3 kilometer]) along sections of I-15 and Valley of Fire Road (KOPs 24 and 39, respectively). Motorists traveling on I-15 would notice the gen-tie lines and other Project facilities in the foreground-middleground and background, including solar arrays, substations, gen-tie lines, collector system features, perimeter fences, and access roads (refer to Figures 3.10-37 and 3.10-40). Although views of the gen-tie structures in the foreground-middleground for motorists on I-15 would be short in duration (a few minutes), these structures would dominate views, be skylined, and interrupt views of the mountain horizon due to their large size and proximity to I-15. Motorists and recreationalists traveling on Valley of Fire Road towards Valley of Fire State Park or BSBCB would notice, for a few minutes, the perimeter fences, access roads, solar arrays, collector system, and O&M facilities in the foreground-middleground and other Project facilities in the foreground-middleground and background, including substations and gen-tie lines (refer to Figure 3.10-53). Perimeter fences, access roads, solar arrays, and collector system features in the foreground-middleground (within 0.5 mile [0.8 kilometer]) of Valley of Fire Road would not dominate views due to their relatively low height

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Table 3.10-1 Results of Visual Contrast Rating and Summary of Visual Impacts

KOP	Viewing Location	Figure Showing Simulations	Distance to Project, miles (kilometers)	Summary of Contrast Rating Factors	Degree of Visual Contrast Created by the Project Before Mitigation/After Mitigation
4	Recreation Staging Area	3.10-20 to 3.10-21	5.6 (9)	The Project would be visible from a normal viewing angle, but in the distance. Viewers at the Recreation Staging Area are usually stationary and so would have a long viewing duration (hours or longer). The Project is expansive in the distance in the horizontal plane but has a minimal scale in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance as viewed from this KOP and is not readily apparent, even for long viewing times, due to the weak contrast.	Weak/Weak
8	Valley of Fire Road and BSBCB	3.10-22 to 3.10-24	0.6 (1)	The Project would be visible from a normal viewing angle. Viewers traveling along Valley of Fire Road are usually in vehicles and could have views of the Project for approximately 12 minutes when heading west towards I-15, with this KOP representing a snapshot of the view at 0.6 mile (1 kilometer) from the Project. The Project's extent in the horizontal plane spans the view but is minimal in the vertical plane. Due to proximity, atmospheric and weather effects on visibility and contrast would be minimal. The Project is at the transition zone from vegetation to mountain ranges, reducing its contrast to moderate. The contrast could be reduced with color treatments.	Moderate/Weak to Moderate
9	Valley of Fire Road	3.10-25 to 3.10-27	3.7 (6)	The Project would be visible from a slightly superior position but is in the distance. Viewers traveling along Valley of Fire Road are usually in vehicles and could have views of the Project for approximately 12 minutes when heading west towards I-15, with this KOP representing a snapshot of the view at 3.7 miles (5.6 kilometers) from the Project. The Project's extent in the horizontal plane spans the view but is minimal in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance as viewed from this KOP and is not readily apparent because of the moderate to weak contrast, which could be reduced with color treatments.	Moderate/Weak to Moderate
11	Recreation Staging Area and Arrowhead Trail	3.10-28 to 3.10-29	4.3 (7)	The Project would be visible from a normal viewing angle, but in the distance. Viewers at the Recreation Staging Area at Arrowhead Trail are usually stationary and so would have a long view duration (hours or longer). The Project is expansive in the distance in the horizontal plane but has a minimal scale in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance as viewed from this KOP and is not readily apparent, even for long viewing times, due to the weak contrast.	Weak/Weak
14	Arrowhead Trail	3.10-30 to 3.10-31	2.3 (3.7)	The Project would be visible from a normal viewing angle, but in the distance. Viewers along the Arrowhead Trail would have views to the Project that could last over an hour (72 minutes) and so would have a long viewing duration as the viewer moves towards I-15. The Project is expansive in the distance in the horizontal plane but has a minimal scale in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance as viewed from this KOP, and is not readily apparent, even for long viewing times, due to the weak contrast.	Weak/Weak
15	BSBCB	3.10-32 to 3.10-34	2.7 (4.3)	The Project would be visible from a slightly superior viewing angle, but in the distance. Viewers along the BSBCB would have views to the Project that could last up to 20 minutes as the viewer moves towards I-15. The Project is expansive in the distance in the horizontal plane but has a minimal scale in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls, although without mitigation it appears as a faint black line in the distance with some vertical texture created by the 34 kV electrical collection system poles. With mitigation, the Project would be difficult to discern from the vegetative plane in the distance, as viewed from this KOP. It is not readily apparent due to weak to moderate contrast.	Moderate/Weak to Moderate
19	Colorock Quarry Road	3.10-35 to 3.10-36	4.1 (6.6)	The Project would be visible from a slightly superior position but is in the distance. Viewers at Colorock Quarry are usually on foot. They would have views of the Project for a longer duration from the outlook (likely minutes). The Project in the horizontal plane extends through a portion of the view in the valley opening in the distance. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance, as viewed from this KOP, and is not readily apparent because of the weak contrast.	Weak/Weak
24	I-15 Northbound	3.10-37 to 3.10-42	0.2 (0.3)	The Project would be visible from a normal viewing angle, with the gen-tie line dominant in the view. The Project would be in view for approximately 2.4 minutes from this KOP. The Project's extent is well into the skyline from the gen-tie line poles or towers. Light and atmospheric conditions would not affect visibility or contrast due to proximity. The gen-tie lines are visible and demand attention because their contrast is strong with the surrounding landscape.	Strong/Strong
32	California Wash	3.10-43 to 3.10-44	2.5 (4.2)	The Project would be visible from a slightly superior viewing angle, but in the distance. Viewers along the California Wash would have views to the Project that could last up to 5 hours for a hiker. The Project is expansive in the distance in the horizontal plane but has a minimal scale in the vertical plane. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. Without mitigation it appears as a faint black line in the distance with moderate contrast. With mitigation, the Project would be difficult to discern from the vegetative plane in the distance, as viewed from this KOP. It is not readily apparent due to weak contrast.	Moderate/Weak to Moderate
33	Old Spanish Trail Road	3.10-45	0.3 (0.5)	The Project would be visible from a slightly inferior angle. Viewers along Old Spanish Trail Road would have views to the Project that could last over an hour (72 minutes) when traveling north in a vehicle towards Valley of Fire Road. Due to this angle of view, only the 34 kV electrical collection system poles would be visible as thin and narrow protrusions below the skyline, but they are widely dispersed across the view. Light and atmospheric conditions would not affect visibility or contrast due to proximity. The spatial relationship of these thin, narrow, vertical elements in front of the mountains and above the vegetative plane create weak to moderate contrast.	Weak to Moderate/Weak to Moderate
34	California Wash	3.10-46 to 3.10-48	0.1 (0.2)	The Project would be visible from a normal viewing angle. Viewers along the California Wash would have views to the Project that could last up to 5 hours for a hiker but would be intermittent due to the concavity of the Wash and screening provided by vegetation. This KOP represents a snapshot of a location within the California Wash where the Project would be most visible. The solar arrays would be visible at the transition point of the vegetation plane and the mountains above it. Light and atmospheric conditions would not affect visibility or contrast due to proximity. The spatial relationship of the rectilinear features with vertical and horizontal structures against the natural vegetation would have moderate contrast that could be reduced with color treatment.	Moderate/Weak to Moderate

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KOP	Viewing Location	Figure Showing Simulations	Distance to Project, miles (kilometers)	Summary of Contrast Rating Factors	Degree of Visual Contrast Created by the Project Before Mitigation/After Mitigation
37	California Wash	3.10-49 to 3.10-50	3.0 (4.8)	The Project would be visible from a normal viewing angle. Viewers along the California Wash would have views to the Project that could last up to 5 hours for a hiker but would be intermittent due to the concavity of the Wash and screening provided by vegetation. This KOP represents a snapshot of a location within the California Wash where the Project facilities are approximately 3 miles (4.8 kilometers) away. The solar arrays would be barely visible over a short horizontal distance between vegetation, with very weak contrast.	Weak/Weak
38	Old Spanish Trail Road	3.10-51 to 3.10-52	5.5 (9)	The Project would be visible from a slightly superior viewing angle, but in the distance. Viewers along Old Spanish Trail Road would have views to the Project that could last over an hour (72 minutes) when traveling north in a vehicle towards Valley of Fire Road. This KOP represents a snapshot of a location within the OSNHT corridor where the Project first comes into view. The Project is hard to discern in the distance footprint with a minimal horizontal and vertical footprint in view. Light and atmospheric conditions of cloud cover and smog reduce the Project's distinction from the vegetative plane in which it falls. The Project is difficult to discern from the vegetative plane in the distance, as viewed from this KOP, and is not readily apparent due to the weak contrast.	Weak/Weak
39	Valley of Fire Road	3.10-53 to 3.10-55	0.1 (0.2)	The Project would be visible from a normal viewing angle. Viewers along Valley of Fire Road heading towards the Muddy Mountains would have views to the Project that could last up to 10 minutes. This KOP represents a snapshot of a location on Valley of Fire Road where the Project would be most visible. The solar arrays would be visible at the transition point of the vegetation plane and the mountains above it. Light and atmospheric conditions would not affect visibility or contrast due to proximity. The spatial relationship of the rectilinear solar arrays with vertical and horizontal structures against the natural vegetation and the stark appearance of the box-shaped O&M building would have strong contrast against the vegetation and mountains in the backdrop. Mitigation would require color treating of array blocks and perimeter fence, applying surface treatments to the fence to reduce glare, and setting back the O&M area from Valley of Fire Road, reducing contrasts to moderate.	Strong/Moderate
40	Valley of Fire Road at the California Wash	3.10-56 to 3.10-58	0.4 (0.6)	The Project would be visible from a normal viewing angle. Viewers along the California Wash would have views to the Project that could last up to 5 hours for a hiker but would be intermittent due to the concavity of the Wash and screening provided by vegetation. This KOP represents a snapshot of a location where the California Wash crosses Valley of Fire Road. The solar arrays would be visible at the transition point of the vegetation plane and the mountains above it. Light and atmospheric conditions would not affect visibility or contrast due to proximity. The spatial relationship of the rectilinear features with vertical and horizontal structures against the natural vegetation would have moderate contrast that could be reduced through color treatment.	Moderate/Weak to Moderate
<p>* No simulation was completed for the All Mowing Alternative at KOP 33 and the Hybrid Alternative because the location is within development area D and would be surrounded by solar panels. Contrast rating for KOP 33 was completed using the visual simulation for the All Mowing Alternative and included for informational purposes. Contrast rating analysis worksheets are provided in the <i>Visual Technical Report for the Gemini Solar Project</i> (Panorama Environmental, Inc. 2019i).</p>					

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(approximately 8 to 12 feet [2.4 to 3.7 meters]) in relation to the flat topography and expanse of the development; however, the O&M building and warehouse would have a dominant effect on views in the foreground-middleground due to their height and solid form. MMs VR-1, VR-2, and VR-4 would be implemented to reduce strong visual contrast for viewers along Valley of Fire Road by incorporating visual design elements and applying color and surface treatments and moving the O&M facilities away from the road.

The Proposed Action would result in moderate contrast in the foreground-middleground (within 0.5 mile [0.8 kilometer]) along a section of Valley of Fire Road and the California Wash (KOPs 34 and 40) and the foreground-middleground along other sections of Valley of Fire Road, BSBCB, and the California Wash (KOPs 8, 9, 15, and 32). The dark color and form of the solar arrays would appear in the vegetative plane of the landscape. Contrast would primarily be generated by the color of the facility in the distance. Where the KOP is closer (within 0.3 mile [0.8 kilometer]), the spatial relationship of the rectilinear features of the solar arrays, with their vertical and horizontal structures against the natural vegetation, would have moderate contrast. Project facilities would not be prominent in the landscape due to natural screening and their relatively low heights (compared to the large expanse of the landscape and the height of the mountains). Motorists and recreationalists traveling on Valley of Fire Road, the California Wash, and BSBCB in these areas would notice perimeter fences, solar arrays, and collector system features within 0.5 mile (0.8 kilometer) (refer to Figures 3.10-46 and 3.10-56) and within 0.5 mile to 5 miles (0.8 to 8 kilometers) (refer to Figures 3.10-22, 3.10-25, and 3.10-32). Project facilities in the foreground-middleground and background would generally be naturally screened due to perspective.

The Proposed Action would result in weak contrast at all other views that were analyzed (KOPs 4, 11, 14, 19, 32, 33, 37, and 38). Contrast would be weak in these areas because little of the Project would appear in the landscape, and the Project would generally blend into the plane of vegetation across the valley. Motorists and recreationalists traveling in these areas would notice some Project features, but visibility would be limited and very short in duration¹⁹ (refer to Figures 3.10-20, 3.10-28, 3.10-30, 3.10-35, 3.10-43, 3.10-45, 3.10-49, and 3.10-51).

Effects on Scenic Quality. The Proposed Action layout would permanently impact roughly 7,100 acres (2,873 hectares) of scenery in the natural landscape where scenic quality is rated as Class C. The scenic quality rating is judged on seven factors. The Project site lies predominantly within SQRU 035 (except for the gen-tie in SQRU 037 west of the I-15) and is assessed as having a low rating in terms of the following elements:

- Landform: A flat valley bottom with few or no interesting landscape features, with the exception of some dunes.
- Vegetation: Minimal variety.
- Water: The absence of water.
- Landscape color: Minimal variation in landscape color.
- Scarcity: The dunes add some interest, but not enough to make the landscape distinctive.

¹⁹ The duration of time that the Project would be visible from each of the routes in the Project area is provided in the *Visual Resources Technical Report for the Gemini Solar Project*. Duration of time for these specific KOPs cannot be provided since KOPs are static, and different KOPs along the same roadway may have different contrasts.

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- Cultural modifications: While the dunes add a level of interest, they are degraded by OHV use.

Introducing solar facilities into the natural character of the Project area would degrade scenic quality by changing an expansive natural landscape to a developed, industrial energy-generation landscape. While the Project would alter the natural landscape, the site is in close proximity to and is similar in character to existing solar development (Moapa Solar Project, the Playa Solar Project, and the Harry Allen Solar Energy Center Project), and thus maintains visual continuity with these other forms of character change. The Project would result in weak to strong contrast, as summarized in Table 3.10-1. Although the Project would result in a few areas of strong contrast, the overall impact would be moderate because the scenic quality in the area is rated as Class C. MM VR-1 would be implemented to further reduce impacts on scenic quality by incorporating design elements to minimize the project footprint and landscape disturbance, to the extent possible.

Effects on Viewers. Project viewers have:

- Low sensitivity, such as at the Moapa Paiute Travel Plaza;
- Moderate sensitivity, such as motorists traveling along I-15; or
- High sensitivity, such as recreationalists traveling along Valley of Fire Road, along BSBCB, along Old Spanish Trail Road, or anywhere within the OSNHT corridor and Arrowhead Trail.

Impacts would depend on viewer sensitivity and the perceived contrasts created by the Project site. Visual contrast would be low to moderate, and thus impacts on viewers with high sensitivity to visual contrast would be low to moderate on:

- California Wash
- Old Spanish Trail Road
- Valley of Fire Road between BSBCB and the Muddy Mountains
- BSBCB
- Colorock Quarry Road
- Arrowhead Trail

Visual contrast would be greatest for viewers on I-15 due to the gen-tie lines and for viewers along Valley of Fire Road in the immediate vicinity of development areas B and C. Several measures to reduce contrast, as previously discussed, would reduce impacts on viewers. Visual contrast would remain high for the gen-tie lines but would be mitigated to moderate along Valley of Fire Road.

Once viewers cross to the west over I-15, the gen-tie lines are within an already highly disturbed transmission corridor. Visual contrast for the gen-tie lines to the west of I-15 would be weak and viewer sensitivity low to moderate in this area, because transmission lines are frequently visible and common in the corridor to the west of the I-15. Contrast from the gen-tie lines as viewed from Valley of Fire Road, where viewer sensitivity is high, would also be moderate. Even though the visual change may be strong, the lines would be more than 0.5 mile (0.8 kilometer) away at the closest point to Valley of Fire Road and would only be in the view for travelers heading back to I-15 from Valley of Fire State Park or the Muddy Mountains.

BLM Management Objectives. The Proposed Action would result in strong contrast where facilities would be visible in the foreground-midground (within 0.5 mile [0.8 kilometer]) along sections of I-15 and Valley of Fire Road (KOPs 24 and 39). The gen-tie lines would dominate foreground-midground

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views along I-15 and at the I-15 crossing location, and the linear and cylindrical form of the gen-tie poles strongly contrast with the continuous silhouette of the mountains and sky in the background, where the poles are 0.03 to 0.5 mile (0.05 to 0.8 kilometer) from the I-15. The O&M building and warehouse would dominate foreground-middleground views along Valley of Fire Road, as the facilities would be located approximately 200 feet (61 meters) away. The large, box-shaped form of these facilities against the natural landscape would be discordant, creating contrast. The smooth, dark form of the solar panels and other Project facilities would contrast strongly with the surrounding texture and color of the valley floor in the immediate vicinity of Valley of Fire Road. Strong contrast from facilities that dominate views would not be compatible with VRM Class III management objectives. MMs VR-1, VR-2, and VR-4 would be implemented to reduce visual contrast by incorporating visual design elements, applying color and surface treatments, and moving the O&M facilities away from Valley of Fire Road. Visual simulations that depict mitigated conditions in areas of strong contrast are provided in Appendix D (KOPs 24 and 39). Mitigation would reduce strong contrast along Valley of Fire Road to moderate, making the Project compatible with VRM Class III. The contrast along I-15 would remain strong because large gen-tie structures would still be present in the foreground-middleground of views from I-15 where the gen-tie crosses the highway to reach Crystal Substation. Because strong contrast could not be avoided, the Proposed Action would require an RMP amendment to change the area affected by strong contrast to a VRM Class IV in order to create consistency with VRM management objectives.

Nighttime Lighting. Project operation would require on-site nighttime lighting for safety and security, which would be dark-sky-compliant. Lighting would be limited to areas required for O&M activities, safety, or security. Lighting for the Project would be directed downward to avoid backscatter and shielded from public view to the extent practical. While the level of light generated by the Project is expected to be low, there are currently no permanent structural lights in the Project area and any uncontrolled or excessive lighting could be noticed by nearby motorists on I-15 or could deteriorate night-sky conditions. MM VR-3 further reduces impacts from nighttime lighting by requiring development and implementation of a Lighting Plan to limit impacts on the night sky during operation.

Decommissioning. Impacts on visual resources during the decommissioning phase of the Proposed Action would reduce contrast associated with the solar facility components but increase contrast from each KOP due to the visibility of bare soils against green vegetation. Because the Proposed Action would result in extensive soil and ground alteration, restoring native vegetation could take a century or longer. Restoration and revegetation monitoring would be implemented to reduce effects. The Site Restoration Plan would also identify acceptable seed types, seeding techniques, monitoring and reporting procedures, and performance standards, per MMs VG-1 and VR-6. Over time, visual impacts would be reduced as the affected landscape returned to a more natural visual condition, but it could take a century or more to recover.

Glint and Glare

Construction. Construction equipment could result in some glare, due to the glass windows or metallic parts, but would not be a source of substantial or distracting glare. No substantial source of glint or glare would be introduced during construction of the Project.

Operation and Maintenance. The results of the glint and glare model under a worst-case scenario indicated that solar panels on the Project site have the potential to result in a glint and glare hazards at six of the 30 observation points, including Observation Points 1 (Ute Road), 2 (Southbound I-15), 3 (Moapa Paiute Travel Plaza), 5 (Valley of Fire Road/BSBCB), 26 (California Wash North), and 27 (Old Spanish Trail Road/California Wash South) (shown on Figure 3.10-59). Motorists traveling in these locations

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could experience an after-image from glint and glare caused by the solar panels for most of the day during summer months (early May to early August). MM VR-4 requires all solar panels to be treated with anti-reflection coatings. The glint and glare model indicated that applying anti-reflection coatings to the solar panels would reduce the duration of potentially hazardous after-images to 24 minutes or less annually. With anti-reflection coatings on the panels, motorists traveling in the area could experience glint and glare for a few minutes per year during the morning and evening of summer months. The potential for motorists to experience hazardous after-images from glint and glare is low due to the short time period indicated in the modeling and the conservative parameters that were used. The adverse effect would be minimized with incorporation of the mitigation.

The FAA was notified of the Project, in accordance with recommendations identified in the *Technical Guidance for Evaluating Selected Solar Technologies on Airports* (FAA 2018). The Applicant and BLM also notified Nellis AFB and initiated outreach efforts. To date, the FAA and Nellis AFB have not raised concerns regarding potential aviation hazards from glint and glare. The Project area is not located within an airport sphere of influence or any restricted airspace or designated route. Public and private aircraft may cross the Project area at high elevations. The many solar projects constructed in the area between the Project site and the nearest airport, Nellis AFB, have not posed a hazard to aircrafts. The Project would involve the installation of solar panels, which unlike concentrated solar power plants produce limited glint and glare and are even compatible for use at airfields, as exemplified by the solar fields at Nellis AFB. The likelihood of the Project causing an aviation hazard from glint and glare is very low due to the distance to the nearest airport and the reflectivity characteristics of PV solar panels. No adverse effect would occur.

Decommissioning. The type of equipment used during decommissioning is expected to be similar to that used during the construction period. Effects from glint and glare would be similar to those analyzed during construction and would not be adverse.

Residual Effects

Implementation of mitigation measures would reduce adverse effects on visual resources; however, residual impacts on visual resources would remain. The Project would not only alter the physical characteristics of the landscape but would also change the scenic values and experiences of sensitive viewers. The Project would contribute to the transformation of the Project site from a primarily natural landscape to a developed landscape. Visitors traveling to Valley of Fire State Park or the Muddy Mountains along Valley of Fire Road or BSBCB would view the Project from both directions, disrupting their experience of traveling to the destination through a continuous natural desert landscape. Motorists and recreationalists traversing the OSNHT-corridor through the Project area or Old Spanish Trail Road would be affected, as they could be traveling immediately adjacent to development areas B, C, D, and E. Even with mitigation, residual visual impacts would remain on scenic quality and on viewers due to the substantial development of an otherwise undeveloped natural desert landscape.

The mitigation identified in the analysis would reduce potential adverse effects from glint and glare caused by the solar panels installed as part of the Project. Implementation of the mitigation would not be expected to result in any unaccounted-for effects. Residual impacts from glint and glare would be minimal.

Cumulative Effects

Approximately 53 percent of BLM-administrated lands within the Mojave Desert ecoregion, which contains the Southern Nevada District Office planning area, have been culturally modified. Forty-eight

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percent of these culturally modified lands are discordant with the landscape's scenic quality (BLM 2014). The Project, in addition to the cumulative projects, would result in additional cultural modification to the landscape of the area. Many cumulative projects would involve the installation of energy and transmission line facilities in the immediate Project area (e.g., #21, TransWest Express Transmission Project, and #6, Moapa Solar Project). Solar facilities and transmission structures are currently visible or would be visible from public views following construction, including along Arrowhead Trail, Valley of Fire Road, OSNHT corridor, Old Spanish Trail Road, and BSBCB (KOPs 8, 14, 32, and 33). The change in character from a natural landscape to one including views of utilities would constitute an adverse cumulative change to the existing landscape. The cumulative effect from impacts on scenic quality in the remaining natural landscape would be substantial. The Project's facilities and gen-tie line would contribute to the adverse cumulative effect. MMs VR-1, VR-2, VR-3, and VR-4 require incorporation of design elements, facility color and surface treatments, a Lighting Plan, and application of anti-reflection coatings on solar panels, which would reduce but not eliminate the Project's contribution to the cumulative effects of development in the Project area.

The cumulative projects may result in glint and glare from discrete locations. However, no cumulative projects that could result in glint and glare would be visible from observation points where glint and glare from the Proposed Action could occur. No cumulative impact would occur.

All Mowing Alternative

Construction

The visual impacts from construction of the All Mowing Alternative would be similar to those described for the Proposed Action, including for nighttime lighting. Much or all of the vegetation on the site would remain under this alternative, resulting in a somewhat reduced temporary impact from the contrast deriving from complete vegetation clearing in the array areas before the arrays are built, as compared with the Proposed Action. During the relatively short period of construction, the Project would result in weak to moderate contrast and would meet VRM Class III management objectives, except for construction of the gen-tie lines. Construction, however, could affect scenic quality and viewers, as described for the Proposed Action. No adverse effects from glint and glare would occur during construction.

Operation and Maintenance

The All Mowing Alternative would utilize development areas A, B, B1, B2, G, and smaller versions of development areas C, D, and E compared to the Proposed Action. Visual simulations for KOPs depicting the visual conditions of the All Mowing Alternative are provided in Appendix D. The All Mowing Alternative would result in similar contrast at KOPs as the Proposed Action, as described in detail in Table 3.10-1. However, the contrast from the Project in KOP 34, where Project facilities would be set back from the California Wash to the east by approximately 1 mile (1.6 kilometers), would be reduced from moderate under the Proposed Action and Hybrid Alternative to weak under the All Mowing Alternative. Where mowing occurs for site development under the All Mowing Alternative, solar panels would be up to 3 feet (0.9 meter) taller than in areas cleared using traditional methods. Slightly taller solar panels were included in the visual simulation model for the All Mowing Alternative to determine the effect on contrast. Minor differences can be detected by comparing simulations at the closest KOPs (KOPs 8, 34, 39, 40), but the slightly taller solar panels would not change the contrast rating as they would not alter the contrast, which typically comes from color or form.

The All Mowing Alternative would result in similar adverse effects on scenic quality and viewers as the Proposed Action; however, mowing would preserve more vegetation under the solar arrays. Preserving

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vegetation under the solar arrays could reduce some contrast associated with cleared areas at superior foreground-middleground views, although the results of the contrast rating were the same. MMs VR-1, VR-2, and VR-3 would reduce contrast and impacts on scenic quality and viewers; however, high contrast would remain where the gen-tie crosses I-15, which would not be compatible with VRM Class III management objectives. Visual impacts after decommissioning would be reduced because a revegetation period would not be necessary. Like the Proposed Action, the All Mowing Alternative would require a land use amendment to change the area affected by strong contrast from the gen-tie lines to VRM Class IV in order to create consistency with VRM management objectives.

Potential glint and glare hazards for this alternative would be similar to those described for the Proposed Action. As noted previously, potential glint and glare conditions were modeled for the entire Project study area. Solar panels for the alternatives would be located in approximately the same locations as under the Proposed Action, near the seven observation points from which potential glint and glare hazards were modeled. It is unlikely that the layout differences would avoid the potential for glint and glare hazards at the locations. MM VR-4 requires all solar panels to be treated with anti-reflection coatings to minimize effects.

Decommissioning

Decommissioning would involve the removal of the facility and restoration of the area. Under the All Mowing Alternative, facility construction would minimize ground disturbance. The vegetation, hydrology, soils, and topography would remain as they are under existing conditions during construction and throughout Project operation. Once the solar facility is removed, the recovery time for the remaining unvegetated areas that could cause contrast from various views would be reduced to a few years, as compared with a century or more for the Proposed Action. Restoration and revegetation monitoring would be implemented to reduce effects. The Site Restoration Plan would also identify acceptable seed types, seeding techniques, monitoring and reporting procedures, and performance standards, per MMs VG-1 and VR-6.

Residual Effects

Maintaining the vegetation under the solar arrays (6,939 acres [2,808 hectares]) would reduce some contrast. The same mitigation would be implemented, but residual adverse impacts would occur from the gen-tie lines, which would be the same as with the Proposed Action.

The same mitigation would reduce potential adverse effects from glint and glare caused by the solar panels installed as part of the Project. Residual impacts from glint and glare would be minimal.

Cumulative Effects

Cumulative impacts would be similar to those described for the Proposed Action. Implementation of the same mitigation measures would reduce but not eliminate the contribution to the cumulative visual effects of development in the Project area.

Hybrid Alternative

Construction

The visual impacts of the Hybrid Alternative from construction would be similar to those described for the Proposed Action and the All Mowing Alternative, including for nighttime lighting. No adverse effects from glint and glare would occur during construction.

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3.10 Visual Resources

Operation and Maintenance

The Proposed Action and Hybrid Alternative would result in approximately the same visual contrast and impacts on scenic quality and viewers because both would utilize similar Project development areas (A, B, C, D, and E). The Hybrid Alternative would include construction in development area B1 and a smaller portion of development area C, but these differences would not be noticeable or change the contrast ratings at KOPs, as described in Table 3.10-1. Where mowing occurs for site development under the Hybrid Alternative, solar panels would be up to 3 feet (0.9 meter) taller than in areas cleared using traditional methods. As discussed under the All Mowing Alternative, the slightly taller solar panels would not change the results of the contrast rating.

The Hybrid Alternative would result in similar adverse effects on scenic quality and viewers as the Proposed Action; however, this alternative would reduce contrast due to the preservation of vegetation over 65 percent of the solar facility. The same mitigation as the All Mowing Alternative would be applied to reduce contrast and impacts on scenic quality and viewers; however, high contrast would remain where the gen-tie crosses I-15, which would not be compatible with VRM Class III management objectives. The Hybrid Alternative would also require a land use amendment to change the area affected by strong contrast from the gen-tie lines to VRM Class IV in order to make ensure consistency with VRM management objectives.

Potential glint and glare hazards for the Hybrid Alternative would be similar to those described for the Proposed Action and the All Mowing Alternative. It is unlikely that the layout differences would avoid the potential for glint and glare hazards at the locations. MM VR-4 requires all solar panels to be treated with anti-reflection coatings to minimize effects.

Decommissioning

Decommissioning would involve the removal of the facility and restoration of the area. Under the Hybrid Alternative, the facility would be constructed using traditional methods over approximately 35 percent of the site and the additional 65 percent of the site would be mowed. The vegetation, hydrology, soils, and topography would remain as they are under current conditions during construction and throughout Project operation within 65 percent of the site. While 65 percent of the site could be restored to pre-Project conditions quickly, the remaining 35 percent could take over a century or longer to recover. The visual impacts from contrast would be similar to those described for the Proposed Action for the portions of the site constructed using traditional methods, and the impacts from contrast would be similar to those described for the All Mowing Alternative for the mowed portions of the site. Restoration and revegetation monitoring would be implemented to reduce effects. The Site Restoration Plan would also identify acceptable seed types, seeding techniques, monitoring and reporting procedures, and performance standards, per MMs VG-1 and VR-6.

Residual Effects

Impacts would be the same as with the Proposed Action. Maintaining the vegetation under 65 percent of the solar arrays (4,460 acres [1,805 hectares]) would reduce some contrast. The same mitigation would be implemented, but residual adverse impacts would occur from the gen-tie lines, which would be the same as with the Proposed Action.

The same mitigation would reduce potential adverse effects from glint and glare caused by the solar panels installed as part of the Project. Residual impacts from glint and glare would be minimal.

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3.10 Visual Resources

Cumulative Effects

The cumulative impacts would be similar to those described for the Proposed Action. Implementation of the same mitigation measures would reduce but not eliminate the contribution to the cumulative visual effects of development in the Project area.

No Action Alternative

The Project would not be built under the No Action Alternative. The existing environmental setting would be maintained, and no visual impacts would occur.

Mitigation Measures

- MM VG-1: Requirements of the Vegetation Resources Management Plan and Integrated Weed Management Plan (from Section 3.6: Vegetation and Jurisdictional Waters)
- MM VR-1: Visual Design Elements (from Section 3.10: Visual Resources)
- MM VR-2: Color and Surface Treatment (from Section 3.10: Visual Resources)
- MM VR-3: Lighting Plan (from Section 3.10: Visual Resources)
- MM VR-4: Anti-reflective Coating (from Section 3.10: Visual Resources)
- MM VR-5: Visual Construction Elements (from Section 3.10: Visual Resources)
- MM VR-6: Visual Decommissioning Elements (from Section 3.10: Visual Resources)

3.11 Acoustics

3.11.1 Affected Environment

Introduction

This section describes the acoustic or noise environment and the regulations that help protect human health and welfare from excessive noise. Regulations and laws that apply to the Project are included in Appendix E.

Definitions

Noise is generally defined as unwanted or objectionable sound. Human response to noise is subjective and can vary from person to person. Factors that can influence individual response include the loudness, frequency, and time pattern; the amount of background noise before an intruding noise; and the nature of the activity (e.g., sleeping) that the noise affects.

The sensitivity of the human ear to sounds of different frequencies is measured by the A-weighted decibel scale (dBA). A 3-dBA change in environmental noise is barely perceptible, while a 5-dBA change is readily perceptible by the human ear (Caltrans 2013). A 10-dBA change in noise levels is judged by most people as a doubling of sound level, while a 20-dBA change is considered a dramatic change in loudness. Normal conversation ranges between 55 and 58 dBA when the people speaking are 3 to 6 feet (0.9 to 1.8 meters) apart (Olsen 1998).

Sound generated by a point source nominally diminishes (attenuates) at an approximate rate of 6 dBA for each doubling of distance away from the source. Noise from a line source (e.g., roadways, corona noise) nominally attenuates at approximately 3 dBA per doubling of distance (USDOT and FHWA 2011).

Corona noise is the audible buzzing noise emitted from high-voltage power lines; this is caused by the discharge of energy that occurs when the electrical field strength on the conductor surface is greater than

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the breakdown strength (the field intensity necessary to start a flow of electric current) of the air surrounding the conductor.

The metrics for evaluating the community noise environment are based on measurements of the noise exposure over a period of time in order to characterize and evaluate the cumulative noise impacts. Key metrics for evaluating community noise are as follows:

- L_{eq} : The equivalent sound level, or the time-integrated continuous sound level, that represents the same sound energy as the varying sound levels, logarithmically averaged over a specified monitoring period. Generally, L_{eq} is over 1 hour.
- L_{max} : The instantaneous greatest noise level measured on a sound level meter during a designated time interval.
- L_{dn} : The day-night average sound level that represents a 24-hour, A-weighted sound level average from midnight to midnight, where sound levels between 10:00 p.m. and 7:00 a.m. have an added 10 dB weighting, but no added weighting on the evening hours (7:00 p.m. to 10:00 p.m.).

Analysis Area

The analysis area for acoustic considerations is limited to areas within 0.5 mile (0.8 kilometer) of the Project site, referred to as the Project area. This geographic extent is appropriate because noise levels attenuate rapidly with distance and noise at the Project site would not likely be heard more than 0.5 mile away.

Baseline Description

Existing Noise Conditions

The Project is located in a rural, undeveloped area, in the vicinity of I-15. Several airports are in the region. Nellis AFB, which is the closest airport, is located approximately 17 miles (27 kilometers) southwest from the Project site. Dominant noise sources contributing to ambient noise levels in the Project area are primarily vehicle traffic along I-15 and Valley of Fire Road, aircraft flyovers, and wind and weather. OHVs may use existing roads and dry washes in the Project area, thus contributing intermittent noises.

Sensitive Receptors

Sensitive receptors are locations where occupants or individuals are more susceptible to excessive levels of noise, or where noise would interfere with normal activities. Sensitive receptors include residential dwellings, hotels, health buildings, educational establishments, places of worship, or any facility or area that require no noise at nuisance levels, such as recreational areas and trails (FHWA 2010).

The nearest sensitive residential receptors are located approximately 13 miles (21 kilometers) north of the Project site, in Moapa Valley, and over 18 miles (29 kilometers) southwest of the Project site, adjacent to Nellis AFB. Passive recreationalists who are hiking outdoors could be considered sensitive receptors. No designated biologically sensitive areas, such as an ACEC, are located in the Project area or within 0.5 mile (0.8 kilometer) of the Project area (refer to Section 3.1: Land Use).

Existing Ambient Noise

Ambient noise in the Project area ranges from between 37 to 44 dB L_{dn} in the more remote locations away from I-15 (Eldred 1981). Noise levels from over 22,000 vehicles traveling along I-15 per day results in higher ambient noise near the highway (NDOT 2017). The noise level from large diesel trucks driving at 40 miles per hour (64 kilometers per hour) is typically 84 dB at 50 feet (15 meters). The noise level from

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a typical highway at 50 feet (15 meters) from the edge of pavement is 76 dB (IAC Acoustics 2019). As the distance from the highway doubles, noise levels will reduce by 3 to 4.5 dB (Caltrans 2014).

3.11.2 Environmental Consequences

Introduction

The construction and operations noise analyses are based on typical equipment and vehicle noise levels and attenuation of noise between sensitive receptors and the Project site. Maximum noise levels from construction equipment and vehicles were estimated using in the Federal Highway Administration’s (FHWA) Roadway Construction Noise Model (RCNM) (FHWA 2008), in accordance with the methodology detailed in the Transit Noise and Vibration Impact Assessment (FTA 2006).

Proposed Action

Construction

Construction of the Proposed Action would involve installation of the solar arrays and power collection systems, erection of the substations, and connection into the transmission system. Construction activities would require the use of several to over a hundred pieces of equipment. Noise levels at 50 feet (15 meters) from the two loudest equipment types for each construction activity, representing a conservative noise level, are reported in Table 3.11-1.

Noise levels would generally range from 70 to 80 dBA L_{eq} at 50 feet (15 meters) during construction. Backup alarms would intermittently sound from a variety of equipment types, resulting in a maximum noise level of approximately 70 dBA L_{max} at 50 feet (15 meters) (Holzman 2011). Noise levels from the loudest construction activity (site preparation) would dissipate to 55 dBA L_{eq} (the USEPA acceptable noise limit for limited outdoor activity) at approximately 1,350 feet (411 meters) from the noise source. Stationary sensitive receptors are located many miles away and would not be impacted by noise generated from Project construction.

Table 3.11-1 Noise Levels Generated by Construction Activities

Construction Activity	Noise Level at 50 feet (15 meters) dB(A) L_{max}	Noise Level at 50 feet (15 meters) dB(A) L_{eq}
Solar Field and Power Collections Systems		
Install BMP Measures (Part of Site Preparation)	75.0	71.3
Site Preparation (Solar Block Arrays)	85.0	83.6
Site Preparation (Roads)	85.0	82.3
Install Fencing	75.0	71.3
Install Tracking System Posts	84.4	78.3
Install Support Structures	75.0	71.3
Install Inverters and Switchgear & Sub-Structure	80.6	76.1
DC and AC Cable Installation (Underground)	80.7	78.4
DC and AC Cable Installation (Above-Grade)	75.0	71.3
Module Installation	75.0	71.3
Fire Protection	80.9	80.8
O&M Building	74.7	68.3

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Construction Activity	Noise Level at 50 feet (15 meters) dB(A) L_{max}	Noise Level at 50 feet (15 meters) dB(A) L_{eq}
Substation		
Steel Structures	80.6	73.8
Insulators, Bus, and Electrical Equipment	80.6	73.8
Control Wiring	80.6	74.9
Gen-Tie/Transmission System		
Structure Installation	80.6	74.9
Conductor/Wire Installation	80.6	78.8
Cleanup	85.0	82.7

Source: (FHWA 2008, FTA 2006)

Passive recreationalists may be exposed to construction noise; however, recreationalists are not expected in the immediate area (that is, within 1,350 feet [411.5 meters]) when the Project is under construction. There are no BLM designated hiking trails in the Project area. Recreationalists in vehicles such as OHVs or in automobiles traveling on routes such as Arrowhead Trail or Old Spanish Trail Road would not be adversely impacted by construction noise, as they would likely be more than 1,350 feet (411.5 meters) from the active construction areas and noise from their own vehicles would likely be greater than that generated by the Project construction.

Operation and Maintenance

Solar array trackers, invertors, transformers, and transmission lines emit low levels of ongoing noise during Project operation. Maintenance, which must occur on the facility, also generates intermittent and occasional noise. Continuous and intermittent noise sources and their noise levels at 50 feet (15 meters) are shown in Table 3.11-2.

Table 3.11-2 Noise Levels Generated by Operation and Maintenance Activities

Source	Noise Level at 50 feet (15 meters) dB(A) L_{eq}	
Maintenance		
Pickup truck	71	
Solar Panels and Substations		
Tracker	41	
Inverter 1 MW	51	
Transformer 2 MW	42	
Gen-Tie Lines		
230 kV ¹ (corona noise)	Rain	39
	Fair Weather	14
500 kV ¹ (corona noise)	Rain	51
	Fair Weather	26
Notes: All equipment noise levels are for one unit.		
¹ From the center of a transmission tower.		

Source: (Satcon n.d., NEMA 2013, Lee 1996, Ldn Consulting 2011, Sengpielaudio 2018, FHWA 2008)

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Noise emitted from equipment associated with the solar facility (i.e., trackers, inverters, gen-tie lines) would be less than 55 dBA at 50 feet (15 meters). Corona noise would likely be along the gen-tie line and would result from the high voltage of the lines. The noise would be most audible during storms, when corona noise could double. Even in worst-case conditions, corona noise would be less than 55 dBA at 50 feet (15 meters). Use of equipment and vehicles during maintenance activities would result in occasional higher noise levels, with a L_{eq} of 55 dBA at 315 feet (96 meters) from the noise source. Stationary sensitive receptors are located many miles away and would not be impacted by Project noise.

Noise from O&M activities would not increase to levels that could interfere with outdoor passive recreational activities. Occasionally, hikers may be in the area of the solar facility, but ambient noise levels would not increase beyond 55 dBA at 50 to 315 feet (15 to 96 meters) of the facility boundary. The occasional hikers in the area could easily avoid areas closest to the facility if noise is an issue.

Decommissioning

Equipment used during decommissioning is expected to be similar to that used during construction. As such, noise levels would also be similar. Noise levels would dissipate to 55 dBA L_{eq} approximately 1,350 feet (411 meters) away. Due to the distance to sensitive residential receptors, noise associated with decommissioning would be negligible. Noise from decommissioning activities would not increase to levels that could interfere with outdoor activities or cause annoyance at the closest sensitive receptors. No short-term, adverse effects on the existing ambient noise level at a receptor would occur.

Residual Effects

No residual noise effects from construction, O&M, and decommissioning/ reclamation of the Proposed Action would occur.

Cumulative Effects

There are very few projects located adjacent to the Project site (some of which are already constructed) that could contribute to cumulative effects. Short-term noise from construction activities and long-term noise from operation of on-site equipment on the Project site and adjacent cumulative project sites could cumulatively increase noise levels in the Project area. No sensitive receptors that could experience cumulative noise level increases are located in the Project area. No adverse, cumulative effect would occur.

All Mowing Alternative

The All Mowing Alternative would result in similar noise effects during construction, O&M, and decommissioning as the Proposed Action. Distances between sensitive receptors are the same as with the Proposed Action, and construction and operations noise levels would be similar with the All Mowing Alternative.

No residual noise effects from construction, O&M, and decommissioning of this alternative would occur.

Cumulative impacts would be the same as described for the Proposed Action.

Hybrid Alternative

The Hybrid Alternative would result in similar noise effects during construction, O&M, and decommissioning as the Proposed Action. Distances between sensitive receptors are the same as with the Proposed Action, and construction and operations noise levels would be similar with the Hybrid Alternative.

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No residual noise effects from construction, O&M, and decommissioning of this alternative would occur.

Cumulative impacts would be the same as described for the Proposed Action.

No Action Alternative

The Project would not be built under the No Action Alternative, and no noise effects would occur.

3.12 Cultural Resources

3.12.1 Affected Environment

Introduction

This section describes the baseline information related to cultural resources. Supplemental information is provided in Appendix F: Cultural Resources Support Information. Cultural resources are expressions of human culture and history in the physical environment. They may consist of physical remains, but also may include areas where significant human events have occurred, even though evidence of the events no longer exists. Cultural resources also include definite locations (sites or places) of traditional cultural or religious importance to specified social and/or cultural groups.

Under NEPA, impacts on all cultural resources are considered, regardless of their eligibility for inclusion in the National Register of Historic Places (NRHP) or local historical designation (40 CFR 1508.27[b][3]; 40 CFR 1508.27[b][8]). Eligibility plays a role in determining the degree of effects on resources. Cultural resources are generally evaluated as one of the following resource types: prehistoric archaeological resources; ethnographic resources; or historic-period archaeological and built environment resources. Cultural resources also include sacred sites and other places of traditional cultural importance, sometimes referred to as traditional cultural properties (TCPs), that are associated with the cultural practices or beliefs of a living community. Cultural resources are evaluated for their eligibility to the NRHP under Title 54 USC, § 300101, et. seq., commonly known as the National Historic Preservation Act of 1966, as amended (NHPA), and Title 54 USC § 306108, commonly known as Section 106 of the NHPA (Section 106). A description of this law and other regulations, laws, and executive orders related to cultural resources are presented in Appendix E. Refer to Section 3.13: Native American Concerns for regulations and laws pertaining to Native American resources.

Data Sources

The baseline description and analysis of potential effects of the Proposed Action and alternatives on cultural resources relies on a literature review and Class III archaeological surveys conducted between February 22 and July 23, 2018 (BLM 2018a), as well as on field visits in September 2018 for sites that could be indirectly affected. The methods of these studies are documented in Appendix F. The National Historic Trails Inventory Project (AECOM 2012) was also referenced.

Analysis Area

The direct area of potential effect (APE) for the Proposed Action and alternatives consists of the nine development areas (designated development areas A, B, B1, B2, C, D, E, F²⁰, and G) and corridors to accommodate gen-tie lines, collection lines, roads, and other necessary support structures, totaling 11,050

²⁰ Development area F was included in the direct APE, as this area was surveyed and considered in the alternatives analysis; however, this development area was not included in any of the alternatives carried through the NEPA analyses.

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acres (4,472 hectares). The indirect APE is defined as a 1.1- to 5-mile (1.8- to 8-kilometer) radius from the direct APE boundary, depending on topography. The indirect APE totaled approximately 186 square miles (482 square kilometers). The indirect effects area includes identified sites that could be indirectly affected by the Proposed Action or alternatives, such as through changes in the visual setting, auditory setting, or atmospheric conditions important to the resource.

Baseline Description

Cultural Setting

Appendix F provides a detailed prehistoric and historic setting for the Project area.

Identified Cultural Resources

Previous Research. In December 2017, and January, April, June, July, and August 2018, archival records searches were conducted through the Nevada Cultural Resources Information System (NVCRIS), the Nevada State Historic Preservation Office (SHPO), and the Southern Nevada Archaeological Archive Database. In addition to the records search, Historic Land Patents and General Land Office (GLO) records were also reviewed for the APE. Historical maps of the area were also consulted, including the 1861 Ives and Whipple map, 1881 GLO Plat Maps, and Rand McNally and Company 1907 map.

The records and literature search results indicated that 12 previously recorded cultural resources are within the direct APE and 191 cultural resources are within the indirect APE of the Project. Of the 12 sites within the direct APE, 10 are prehistoric and two are historic. Nine of the 10 prehistoric sites were not previously evaluated for NRHP eligibility, and one was evaluated but is not eligible for listing in the NRHP. The two historic sites include the Old Spanish Trail/Mormon Wagon Road and the Union Pacific Railroad. The Old Spanish Trail/Mormon Wagon Road is listed on the NRHP. One previously recorded segment of this resource, located to the west of I-15 near the Crystal Substation, was found in the literature search for the direct APE. This previously recorded segment is recommended as a non-contributing element to the NRHP-eligible Old Spanish Trail/Mormon Wagon Road. The segment was not found during the 2018 Knight & Leavitt field surveys for the Project; it appears to have been destroyed during construction of the Crystal Substation and the activities associated with the numerous powerlines in the immediate area (BLM 2018a). The BLM is seeking concurrence on the finding with the SHPO that this site is a non-contributing element. No other segments of the Old Spanish Trail/Mormon Wagon Road were identified in the literature searches for the direct and indirect APE.

One other segment of the OSNHT that was not included in the state databases and therefore did not appear during the literature review for the Project. The site was based on a 2010 inventory of the Project area under the National Historic Trails Inventory Project, an American Recovery and Reinvestment Act of 2009 Project (AECOM 2012). This study documented a 5,843-foot (1,781-meter) length of the “California Crossing” of the Old Spanish Trail (Figure 3.14-1). The segment was described as a contributing element to the overall eligibility of the Old Spanish Trail/Mormon Wagon Road for listing the NRHP in the 2010 documentation. This segment was not identified during intensive Class III surveys conducted by Knight & Leavitt but was searched for during a field visit on March 7, 2019, after review of the National Historic Trails Inventory Project Report (AECOM 2012). The March 7 field visit found that what appears to be the previously recorded segment has since been turned into a two-track road, which is why it was not identified during the intensive Class III survey. Given the previous research findings, the segment is still believed to retain the integrity of location, setting, feeling, and association, even though the ground surface has been altered into a well-used, modern, two-track road. The BLM is seeking concurrence from the SHPO that the site is a contributing segment to the NRHP-eligible Old Spanish

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Trail/Mormon Wagon Road based on events and location under Criterion A of the NRHP. The OSNHT corridor is located in the Project area. For more information on the setting of the OSNHT, refer to Section 3.14: Old Spanish National Historic Trail.

The Union Pacific Railroad is eligible to the NRHP, but only non-contributing segments are present in the vicinity of the direct and indirect APE of the Project.

Of the 191 sites within the indirect APE, only 12 need to be considered based on the type and nature of the resources and on their eligibility or potential eligibility for listing in the NRHP. Of those 12, two are prehistoric and five are historic, with another five of unknown age. These 12 sites were visited in the field for further evaluation.

Archaeological Survey. An intensive Class III archaeological pedestrian survey of the direct APE was conducted between February 22 and July 23, 2018, and site visits were conducted in September 2018 and March 2019 (as previously described). Archaeological sites within the indirect APE that required an indirect effects assessment were also visited. For the survey of the direct APE, survey crews walked transects spaced at no more than 30-meter intervals. The Moapa Band of Paiutes provided monitors to assist in the survey and recording of sites. Further details on survey methodology are provided in Appendix F.

A total of 50 archaeological sites and 104 isolates were identified and recorded within the direct APE during the survey. Twenty-two of the archaeological sites are historic, 27 are prehistoric, and one is historic as well as ethnohistoric (and possibly prehistoric). Of the 50 archaeological sites, only three sites that fall within the Proposed Action area and the considered alternatives areas are recommended by the BLM as eligible for the NRHP. One additional site is a non-contributing segment of an eligible site (the Union Pacific Railroad). Isolated occurrences or isolates, by definition, do not meet the criteria necessary for NRHP evaluation and are generally not considered significant cultural resources under NEPA.

Of the three archaeological sites recommended as eligible for listing in the NRHP, two are prehistoric lithic sites located in development areas C (26CK10563) and B2 (26CK1212). The other recommended eligible site (26CK10598), located in development area A, was identified by the Moapa Band of Paiutes as a place the tribe used throughout historic, ethnohistoric, and possibly prehistoric times. The Moapa Band of Paiutes considers it a place of significance and has requested the site be identified as a TCP. No additional places to which tribes attach cultural or religious significance have been identified within the Project area. The small segment of the Union Pacific Railroad is recommended as a non-contributing segment to the eligible historic site, since the site within the Project area is completely modern. The two traces of the Old Spanish Trail (previously discussed) are expected to be non-contributing elements to the NRHP-eligible Old Spanish Trail/Mormon Road, although concurrence from SHPO is pending.

The 12 eligible and potentially eligible sites within the indirect APE that could sustain potential visual effects from the Proposed Action were visited during the September 2018 field visit to determine NRHP status and whether further analysis of indirect effects was required. Of the 12 sites visited in the field, eight were found not to require a visual analysis because they either were not eligible upon further inspection or their eligibility was not reliant on the visual setting. The remaining four sites included three historic NRHP recommended eligible sites (Historic Arrowhead Trail Highway/Old Highway 91, a railroad construction camp, and relay and microwave site with road and power line) and one unevaluated/potentially eligible historic site (a historic mortared rock cistern). A visual analysis was completed for these four sites; however, the historic mortared rock cistern was not found in the field. The

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visual analysis was still performed at the plotted site location of the resource. The results of the literature search and field survey are summarized in Table 3.12-1.

Table 3.12-1 Literature Search and Field Survey Results

Study	Total Sites	Ineligible, Recommended Ineligible, or No Potential to Affect the Site	Eligible, Recommended Eligible, or Potentially Eligible for NRHP-Listing		Notes
			Prehistoric Sites	Historic Sites	
Literature Search of Direct APE	12	1	9	2	Historic sites include the Union Pacific Railroad and Old Spanish Trail/Mormon Trail
Field Survey of Direct APE	50	45	3	2	A non-contributing element of Union Pacific Railroad was identified in the field surveys. The non-contributing trace of the Old Spanish Trail near Crystal Substation was not found in surveys. One of the contributing sites is a trace of the Old Spanish Trail on the Project site.
Literature Study and Field Study of Indirect APE	191	187	2	5	One of the four sites was not located in the field. Another five were of unknown age.

3.12.2 Environmental Consequences

Introduction

Evaluation of Historical Significance

A key part of any cultural resource’s analysis under NEPA and NHPA Section 106 is to determine whether the cultural resources that a proposed action or alternative may affect, directly or indirectly, are historically significant. NEPA requires consideration of impacts on both NRHP-eligible resources (also referred to as “historic properties”) and significant cultural resources (40 CFR 1508.27[b][3]; 40 CFR 1508.27[b][8]). Effects on resources of traditional religious and cultural importance to Indian tribes are also considered. Section 106 requires federal agencies to consider the effects of their undertakings on any historic district, site, building, structure, or object that is included in or eligible for inclusion in the NRHP. Consultation with Indian tribes, SHPO, and interested parties is required throughout the Section 106 process (36 CFR 800.2[a][4]; 36 CFR 800.1[c]).

Assessing Effects on Cultural Resources

The NEPA analysis considers direct, indirect, and cumulative effects on cultural resources regardless of whether they are listed in or eligible for the NRHP. For BLM-identified historic resources eligible for or listed in the NRHP, the 36 CFR 800 regulations that implement the NHPA describe an adverse effect as an effect “found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association” (36 CFR 800.5[a][1]). Adverse effects of the undertaking may also include reasonably foreseeable effects that occur later in time, are farther removed in distance, or are cumulative.

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Resolving Adverse Effects

Once adverse effects on cultural and historical resources have been identified, the final phase of a cultural resources analysis is to seek ways to resolve those impacts of a proposed action or alternative that have been found to be significant or adverse. Mitigation under NEPA includes the development of measures that would avoid, minimize, rectify, reduce, or eliminate an impact over time, or provide compensation for such an impact (40 CFR 1508.20).

The Applicant, BLM, SHPO, OSTA, and federal OSNHT administrators (BLM and NPS) are developing a MOA and a Historic Properties Treatment Plan (HPTP) in accordance with 36 CFR Section 800.6 that will address adverse effects on historic properties resulting from the Project, as described in this analysis. Under the NHPA Section 106 process, the BLM is consulting with the SHPO/Tribal Historic Preservation Officer and other parties to develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties (36 CFR 800.6[a]).

Proposed Action

Construction

Ground-disturbing construction activities have the potential to adversely affect the two prehistoric resources recommended eligible for listing in the NRHP that are located within the Proposed Action APE in development areas A (26CK10598) and C (26CK10563), as well as the 5,843-foot (1,781-meter) length of the “California Crossing” of the Old Spanish Trail that is a contributing element to the overall eligibility of the Old Spanish Trail/Mormon Wagon Road for listing the NRHP. The BLM is seeking concurrence from the SHPO on the eligibility of these sites for listing in the NRHP, as well as BLM’s determination that the Project would have adverse effects to each of these historic properties.

MM Cultural Resources (CR)-1 requires that an Environmental Exclusion Area (EEA) and buffer be established around the prehistoric site in development area A. The measure also requires that the EEA be completely removed from the Project footprint in the engineering and design plans, prior to construction, resulting in redefinition of the development area A boundary. Implementation of MM CR-2 requires development and implementation of a Cultural Resources Monitoring and Mitigation Plan (CRMMP) separate from the HPTP developed as part of the MOA. The CRMMP would specify that no activity would occur outside of the designated Project footprint, consequently prohibiting entry into the prehistoric site in development area A. These measures would avoid direct, adverse effects on the resource in development area A.

The NRHP recommended eligible prehistoric site in development area C (26CK10563) would likely be affected by development of the facility, as would the segment of the OSNHT (including its setting, feeling, and association). The MOA and HPTP are being developed to address adverse effects on these NRHP recommended eligible sites, as previously described. MM CR-2 would ensure that the procedures identified in the MOA and HPTP are implemented.

Construction of the Proposed Action could unearth, expose, or disturb previously unknown subsurface archaeological, historic, or Native American resources eligible for listing in the NRHP, or otherwise important cultural resources that may not have been apparent on the surface during the survey. MM CR-2 requires construction to halt in the event that cultural resources are discovered during construction; cultural resources worker awareness training; and implementation of the CRMMP, detailing procedures for handling the inadvertent discovery of cultural resources. This measure would minimize potential direct, adverse effects related to the discovery of and possible damage to previously unknown but

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important cultural resources. If any discovered resources cannot be avoided during construction, adverse effects on these resources would be addressed under the MOA and HPTP.

Construction of the Proposed Action has the potential to unearth human remains and associated cultural items as defined by Native American Graves Protection and Repatriation Act (NAGPRA). MM CR-3 would be implemented if human remains and associated cultural items as defined by NAGPRA are encountered. The measure requires that work be halted in the area of the discovery, and that a BLM-authorized officer be immediately informed. Native American remains and associated cultural items would be treated as unanticipated discoveries in accordance with the NAGPRA. Implementation of MM CR-3 would minimize potential adverse effects related to the discovery of human remains and associated cultural items as defined by NAGPRA.

Indirect effects on known and unknown cultural resources could occur from theft or vandalism during construction. Construction would likely deter the normal recreational activity by the general public that currently occurs in the Project area; however, as many as up to 900 construction workers could be on the Project site at a time. MM CR-1 requires that an EEA, consisting of a minimum 100-foot (30-meter) buffer, also be established around any other known NRHP recommended eligible or NRHP-eligible resources within 500 feet (152 meters) of the Proposed Action boundary (primarily resources found on the eastern side of the California Wash outside of development area C), and construction personnel be trained per MM CR-2 to avoid the areas. The training would include the consequences of disturbing cultural resources. The measure would minimize potential indirect adverse effects on significant cultural resources from construction.

Operation and Maintenance

Direct impacts during O&M would not occur, as new ground disturbance would not occur. The data from the known NRHP recommended eligible site in development area C (26CK10563) would be recovered prior to construction. The NRHP recommended eligible prehistoric site in development area A (26CK10598) would be entirely excluded from the Proposed Action's footprint per MM CR-1 and therefore would not be affected during O&M.

Indirect impacts on archaeological resources from theft or vandalism caused by increased public access are not expected. The Proposed Action would not provide new public access to areas with the potential to contain archaeological resources. Any significant archaeological resources found on the Project site during construction would be collected and curated per the CRMMP prepared under MM CR-2, and the public would not be allowed onto the solar field. Public access along the California Wash (where archaeological resources could be found ex-situ) may increase over existing conditions due to the rerouting of Old Spanish Trail Road to the California Wash (refer to Section 3.2: Recreation). However, most travelers on Old Spanish Trail Road are in vehicles and would also have the option to be rerouted to Route 167, or Arrowhead Trail, which are more established vehicle routes than the California Wash. Public access along the California Wash may increase slightly above existing conditions; however, the increased risk to archaeological resources is expected to be minimal given the small number of recreationalists on foot that may be diverted to the California Wash and the relative obscurity of the resources near the wash to someone not trained in archaeological discovery.

Indirect effects from increased erosion that could expose, transport, weather, and rebury archaeological, historic, or Native American resources are not expected. Flow patterns over the Project site are not anticipated to change dramatically once the Proposed Action is operating. Graded areas within the solar facility would be limited but would be sloped and protected to prevent the creation of rills or gullies in

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accordance with the design-level geotechnical evaluation, which is also necessary to protect the solar infrastructure. Section 3.3: Geology, Soils, and Mineral Resources addresses erosion, which specifies implementation of erosion controls in accordance with MM GS-1. These erosion control measures would minimize erosion and possible exposure of cultural resources.

Indirect visual, auditory, and atmospheric effects due to the Proposed Action were evaluated for three historic NRHP recommended eligible sites (Historic Arrowhead Trail Highway/Old Highway 91, a railroad construction camp, and relay and microwave site with road and power line) and one unevaluated/potentially eligible historic site (a historic mortared rock cistern that was identified in the literature review but not found in the field). No indirect auditory or atmospheric effects would occur. The Proposed Action was found to have an adverse indirect visual effect on the segment of the NRHP-eligible Arrowhead Trail east of I-15 and the NRHP-eligible railroad construction camp site, because the Proposed Action would create some visual contrast in relation to the Arrowhead Trail and the railroad construction camp. The indirect impacts on these sites would be addressed under a MOA, as previously described, but could remain adverse.

The Proposed Action was not found to have an indirect adverse effect on the microwave relay site. The Proposed Action would be visible from the NRHP recommended eligible microwave relay site but would not dominate the landscape due to the presence of the Moapa Solar Project, which looks similar to the Proposed Action. Views from the microwave relay site are not related to the functionality or intent of the site. The Proposed Action also would not have an adverse effect on the setting for the historic mortared rock cistern as this resource is within a drainage, and views from of the Project would be difficult to see from this location. Open space views would be retained, minimizing adverse indirect effects. Indirect effects on the TCP would not occur, as the resource's importance is not linked to its visual setting.

The Project would cause direct impacts on the contributing elements to the NRHP recommended eligible Old Spanish Trail/Mormon Wagon Road, since this resource is located within development area B. The Project would alter the setting, feeling, and association of the resource and thus adversely affect its eligibility for listing in the NRHP. Impacts under Section 106 would be adverse but mitigated through the required MOA and HPTP. Refer to Section 3.14: Old Spanish National Historic Trail for additional analysis of effects on the Congressionally designated OSNHT.

Decommissioning

Decommissioning activities would be similar to construction activities. The Applicant would limit reclamation and decommissioning activities to previously disturbed areas and existing access roads to the extent practicable. A Decommissioning Plan would be prepared that would include procedures for continued avoidance of the NRHP-eligible sites that were avoided during construction of the Proposed Action. Direct and indirect impacts on unknown cultural resources would not occur, as all affected areas would have been previously disturbed. No adverse impacts are expected. Adverse effects on cultural resources would not occur from decommissioning.

Residual Effects

Implementation of the mitigation measures would reduce potential adverse effects but not eliminate them. The setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail would be adversely affected. Indirect adverse visual effects on Arrowhead Trail and the railroad construction camp would also occur. One prehistoric site would require data recovery, as it would be permanent removed from its location in the solar field. Mitigation measures have been proven to reduce adverse effects on cultural resources resulting from surface-disturbing projects on BLM-administered

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land throughout the western United States. However, even in the most effective cultural resources monitoring and mitigation plan, inadvertent damage to NRHP-eligible resources can occur when the resources are uncovered by excavation equipment. Unless an NRHP-eligible resource is destroyed, damage caused by construction equipment can typically be repaired in an archaeological laboratory. Implementation of the mitigation measures themselves are not expected to result in any impacts.

Cumulative Effects

The loss of several resources from a particular tribe or representing a particular time period could result in significant impacts with respect to the information those resources possess. Other projects in the region could affect resources with similar information about a particular tribe or timeframe, resulting in a cumulative effect. Several cumulative projects in the area could or did directly and indirectly affect cultural resources. Although many cumulative projects would affect cultural resources, only a few projects (#8, #19, #20, and #21 from Table 3.0-2) were found to directly affect resources eligible for listing in the NRHP. Cumulative projects could directly affect previously unknown cultural resources during construction, and the cumulative effect from the loss of these resources could be substantial. The Proposed Action would directly affect cultural sites eligible for the NRHP. Indirect effects on cultural resources would also occur in the direct and indirect APE. These eligible sites are not directly connected to the known eligible sites identified in the cumulative project area; however, the sites may provide data from a similar time period or the same Native American tribe. The Proposed Action could directly affect previously unknown resources. The Project would contribute to a substantial cumulative effect. MMs CR-1 and CR-2 would reduce the contribution to the effect on known and unknown NRHP-eligible cultural resources by establishing a buffer around known resources and conducting data recovery of cultural resources if unavoidable, under the MOA and HPTP. The Proposed Action's contribution to the substantial cumulative effect on cultural resources would be minimized.

All Mowing Alternative

The All Mowing Alternative would involve ground-disturbing activities that could adversely affect the three recommended NRHP-eligible resources located in development areas A (26CK10598), B2 (26CK121), and C (26CK10563) as well as the NRHP-eligible contributing segment of the Old Spanish Trail found in development area B. The All Mowing Alternative would implement mowing across the Project site; however, previously unknown cultural resources could still be uncovered during construction and potentially damaged or crushed. Erosion that could expose previously undiscovered resources would be reduced under this alternative but could still occur along access roads. Human remains could be discovered during construction. Adverse, direct and indirect effects on cultural resources and human remains could occur and would be similar to those discussed for the Proposed Action. The important tribal resource in development area A would be avoided by implementation of MM CR-1, which requires establishment of an EEA and buffer around the resource and movement of the Project site boundary to avoid the resource entirely. Data recovery and preservation of the resources in development areas B2 (26CK1212) and C (26CK10563) would occur, as specified in the CRMMP required by MM CR-2, and under the MOA and HPTP. The CRMMP also provides specifications in the event an unknown resource is uncovered. MM GS-1 and recommendations per the design-level geotechnical investigation would minimize erosion that could uncover cultural resources. MM CR-3 would be implemented if human remains were discovered. With mitigation, direct and indirect effects on cultural resources would be reduced, but adverse effects on the resources in development areas C (26CK10563) and B2 (26CK1212) would still occur because the resources would need to be recovered from the site. The setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail would experience direct adverse impacts under the Project. Indirect adverse visual impacts on the Arrowhead Trail and the

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railroad construction campsites would remain as well, similar to the Proposed Action. The All Mowing Alternative would involve constructing the facility by minimizing ground disturbance. The vegetation, hydrology, soils, and topography would remain the same as under existing conditions during construction and throughout Project operation. Once the solar facility is removed, the site could be restored within a few years. Approximately 3 percent of the site would be disturbed for the construction of roads and facilities. The setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail would be restored for posterity.

Residual effects would include the removal of the three NRHP-eligible resources in development areas B2 (26CK1212) and C (26CK10563). Residual and adverse effects would occur on the setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail, similar to those described for the Proposed Action. Under the All Mowing Alternative, however, the effects on the setting, feel, and association of the segment of the Old Spanish Trail would cease after decommissioning. Restoration to pre-Project conditions would be feasible under this alternative because the habitat and landscape would be maintained over the life of the Project.

Cumulative effects from the All Mowing Alternative would be the same as those described for the Proposed Action.

Hybrid Alternative

The Hybrid Alternative would involve ground-disturbing activities that could adversely affect the two NRHP-eligible resources in development areas A (26CK10598) and C (26CK10563), as well as the NRHP-eligible contributing segment of the Old Spanish Trail found in development area B. Construction activities could uncover and damage or crush known and unknown resources. Substantial adverse direct and indirect effects on cultural resources could occur, similar to those described for the Proposed Action. MMs CR-1 through CR-3 and MM GS-1 would be implemented to reduce effects, but the resource in development area C (26CK10563) would need to be recovered from the site. The setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail would experience direct adverse impacts under the Project. The indirect adverse visual impacts on the Arrowhead Trail and the railroad construction campsites would remain over the life of the Project, similar to the Proposed Action. The Hybrid Alternative would involve constructing the facility by minimizing ground disturbance over 65 percent of the site. The vegetation, hydrology, soils, and topography would remain in place during construction and throughout Project operation within development areas A, B1, B, and portions of D. The development areas where the NRHP-eligible contributing segment is located would be mowed. Once the solar facility is removed, 65 percent of the site could be restored within a few years, particularly the areas around the physical location of the contributing segment of the Old Spanish Trail. However, the setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail could be affected for longer because areas to the east developed using traditional methods would leave a considerable mark on the landscape for several decades or longer and would continue to affect the setting, feel, and association.

Residual effects would include the removal of the one NRHP-eligible resource located in development area C (26CK10563). Residual and adverse effects would occur on the setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail, similar to the Proposed Action. Impacts on the setting, feel, and association of the NRHP-eligible contributing segment of the Old Spanish Trail would be reduced after decommissioning but would remain due to the lasting impacts on areas developed using traditional methods of construction.

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Cumulative effects would be the same as those described for the Proposed Action.

No Action Alternative

The Project would not be built under the No Action Alternative. Under the No Action Alternative, no changes would be implemented on the site. The site would remain in its existing condition, with no new structures or facilities constructed or operated and no new ground disturbance. As a result, no loss or degradation of cultural resources would occur.

Mitigation Measures

- MM CR-1: Establishment of Environmental Exclusion Areas (from Section 3.12: Cultural Resources)
- MM CR-2: Cultural Resources Monitoring and Mitigation Plan (from Section 3.12: Cultural Resources)
- MM CR-3: Discovery of Human Remains and Associated Cultural Items as Defined by NAGPRA (from Section 3.12: Cultural Resources)
- MM GS-1: Operation and Maintenance Erosion Control (from Section 3.3: Geology, Soils, and Mineral Resources)

3.13 Native American Concerns

3.13.1 Affected Environment

Introduction

This section focuses on environmental and socioeconomic concerns that are specific to Native Americans or to which Native Americans bring a distinct perspective. Several regulations, policies, and laws pertain to Native American concerns, including the American Indian Religious Freedom Act, the NAGPRA, and Executive Order 13007. These regulations are described in more detail in Appendix E.

Data Sources

Native American consultations were conducted by the BLM over several months, expanding on larger efforts undertaken by BLM to consult on renewable energy projects in southern Nevada (DOE and BLM 2012). Input received from the tribes is incorporated into this analysis. The *Ethnographic and Class I Records Searches Report*, which includes a detailed ethnohistory of the Dry Lake SEZ region and tribal interviews, is incorporated here by reference (SWCA Environmental Consultants 2011). Information on the prehistory and ethnography of the region is also presented in detail in Appendix F.

Analysis Area

The analysis area includes the area of disturbance for all Project components (including for the Proposed Action and alternatives), including the solar facility and all associated components, roads, collector lines, and the gen-tie lines.

Baseline Description

Federally Recognized Tribes

The Project site falls within the tribal traditional use area generally attributed to the Southern Paiute (Kelly and Fowler 1986). All federally recognized tribes with Southern Paiute heritage were contacted and provided an opportunity to comment or consult regarding this EIS. The consulted tribes are listed in

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Table 3.13-1. The list of contacts for the government-to-government consultation efforts are presented in Chapter 4: Consultations, Coordination, and Public Involvement.

The Southern Paiute

Territorial Boundaries. The traditional territory of the Southern Paiute lies mainly in the Mojave Desert, stretching from California to the Colorado Plateau. The Indian Claims Commission has judicially recognized this area as the traditional use area of the Southern Paiute (Royster 2008). The Moapa River Valley is a core area of Southern Paiute population and culture.

Overview of Culturally Important Resources. The Southern Paiute have used the Project area for thousands of years; the region is of great cultural significance, as they believe their Creator gave these lands to them. The Project area contains numerous cultural features that contribute to the history and the long-term use of this region by the Southern Paiute. The Southern Paiute have a deeply rooted spiritual connection to the land that weaves stories and songs into the landscape, connecting all elements of the universe. These connections involve water, trails, flora, fauna, geographic structures, and spiritual, historical, and ceremonial events.

Table 3.13-1 Federally Recognized Tribes with Traditional Ties to the Project Site

Tribe	Location	State	Date Consultation Conducted by BLM
Moapa Band of Paiutes	Moapa	Nevada	9/18/2017 9/11/2018 2/12/2019
Las Vegas Paiute Tribe	Las Vegas	Nevada	11/13/2017 9/4/2018 2/27/2019
Fort Mojave Indian Tribe	Needles	California	7/13/2018 2/25/2019
Twenty-Nine Palms Band of Mission Indians	Coachella	California	7/18/2018 3/20/2019
Chemehuevi Indian Tribe	Lake Havasu	California	7/28/2018 2/23/2019
Bishop Paiute Tribe	Bishop	California	8/1/2018
Timbisha Shoshone Tribe	Bishop	California	8/20/2018 3/18/2019
Colorado River Indian Tribes	Parker	Arizona	3/26/2019

Water Resources. Water is an essential prerequisite for life in the arid areas of the Great Basin. As a result, water is a keystone of many desert cultures’ religions. All water is considered a sacred, purifying agent. Water sources are seen as connected, so damage to one source damages them all (Fowler 1991, Stoffle, Zedeno and Halmo 2001). No permanent water sources are found on the Project site; however, water flowing from the surrounding mountains converges in the California Wash and flows to the Muddy River. Moapa tribal representatives stated that the Muddy River represents an important place for permanent Native American communities. The water from the Muddy River was cited as a source of healing (SWCA Environmental Consultants 2011).

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Geologic Features. Prominent geologic features in the Project area include the surrounding mountain ranges, including the Muddy Mountains directly south and east of the Project site and the Arrow Canyon Range further to the north. A detailed description of the Muddy Mountains and their significance to the Moapa Band of Paiutes is provided in Appendix F. The Arrow Canyon Range, located northwest of the Project area, is directly connected to the Cry Ceremony and the associated Salt Song Trail. The Cry Ceremony is performed when a Southern Paiute person passes away, and specially trained singers perform the Salt Song. This song and associated spiritual trail carry the soul of the deceased along a thousand-mile journey into the spiritual world or afterlife.

Botanical Resources. Plants play a large role in many different types of ceremonial and non-ceremonial activities. The Southern Paiute were active plant managers of both domesticated and non-domesticated plants, and tribe members continue to make use of a wide range of indigenous plants for food, medicine, construction material, and other uses. The plant cover types present at the Project site are noted in Section 3.6: Vegetation and Jurisdictional Waters. Of these, creosote bush has current Native American medicinal uses, while catclaw was a former food source (Stoffle, R., et al. 1999, Stoffle, Zedeno and Halmo 2001, Phoenix Biological Consulting 2018a).

Wildlife Resources. Bighorn sheep are the animals of greatest concern to local Native Americans. Although now restricted, sheep hunting was formerly an important, religiously significant part of Southern Paiute culture. The desert tortoise is often mentioned by the Moapa Band of Paiutes as a species that should be protected and was once a food source (Stoffle, R.W., and H.F. Dobyns 1983). The Project site is also within the range of some game species traditionally important to Native Americans (Stoffle, R.W., and H.F. Dobyns 1983, Kelly and Fowler 1986).

Native American Concerns Identified Through Consultation

BLM staff consulted and invited tribes to participate in consultation. During the meetings with the tribes, the BLM requested assistance in identifying any issues or concerns about the Project, including the identification of sacred sites and places of traditional religious and cultural significance that might be affected. BLM staff traveled to and consulted with the tribes noted in Table 3.13-1, of which none have expressed specific concerns about the Project to date. The Moapa Band of Paiutes has communicated that one of the cultural sites identified during the surveys is a place of significance and requested that the site become a TCP.

3.13.2 Environmental Consequences

Proposed Action

Construction and Operation/Maintenance

Impacts on Native American religious practices, generally, can occur through the destruction or degradation of important plant and water resources and/or the destruction of habitat or impediments to the movement of culturally important wildlife. Impacts can also occur through the destruction of culturally significant archaeological and historic resources, destruction of or disruption to TCPs, and alteration of significant spiritual geologic formations or geographic locations.

Construction and operation of the Proposed Action would most likely result in the removal of plant species important to Native Americans or render them inaccessible for the life of the Project (approximately 30 years). Most of the site (over 90 percent) is comprised of creosote-white burrobush shrubland alliance, which includes traditional medicinal plants such as burro bush (*Ambrosia dumosa*),

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creosote bush (*Larrea tridentata*), and saltbush (*Atriplex spp.*) (Phoenix Biological Consulting 2018a). Food sources including cholla cactus (*Cylindropuntia spp.*), catclaw acacia (*Acacia greggii*), desert trumpet (*Eriogonum inflatum*), Anderson thornbush (*Lycium andersonii*), and yucca (*Yucca spp.*) are found throughout the Project site as well. Medicinal plants including Mormon tea (*Ephedra sp.*) and saltbush are also found on the Project site. These plants are all common and found throughout the region. While construction and subsequent operation of the Project would render approximately 7,100 acres (2,873 hectares) of lands inaccessible, the surrounding areas contain tens of thousands, if not hundreds of thousands, of acres of similar types of habitat and vegetation—particularly on the Moapa River Indian Reservation to the north of the Project site—that support these traditional plants. Mesquite groves and rice grass fields, which are rare and important remnant agricultural features to Native Americans, are not found on the Project site. No concerns regarding medicinal plants or plants used as food sources were expressed during BLM consultation with the Native American tribes. Impacts would not be adverse because the Project site does not support rare medicinal or food source plants that cannot be found in the surrounding areas, and any important plants that are present are also readily available in the region.

No adverse impacts on wildlife migration that could affect Native American religious concerns are expected to occur. A well-established herd of bighorn sheep is present in the Muddy Mountains and Valley of Fire region; however, the bighorn sheep do not regularly use the Project site, and adverse effects on their migration patterns are not expected. Desert tortoise is often mentioned by the Moapa Band of Paiutes as a species that should be protected and was once a food source (Stoffle, R. W., and H.F. Dobyns 1983). The Proposed Action would result in adverse impacts on desert tortoise (refer to Section 3.7: Wildlife, Migratory Birds, and Special Status Species, and Section 3.8: Threatened, Endangered, and Candidate Species). Smaller game species important to Native Americans that can be found in the Project area include desert cottontails (*Sylvilagus audubonii*) and woodrats (*Neotoma lepida*), but these species are also common and accessible throughout the region. Construction and O&M would not have adverse effects on Native American religious concerns related to culturally important plants and animals.

The Proposed Action could have adverse effects on TCPs and prehistoric/archaeological resources important to Native Americans. MMs CR-1 and CR-2 require the avoidance of known TCPs and the avoidance or treatment of any known or discovered NRHP-eligible archaeological and historic resources during construction and operation of the Proposed Action, as well as cultural resources worker awareness training. Potential adverse effects on Native American religious concerns would also be resolved through compliance with the terms of the MOA and HPTP currently in development and executed under Section 106 of the NHPA. In accordance with 36 CFR 800.14(b), the BLM is preparing the MOA and HPTP in consultation with the SHPO, Native American tribes, and other consulting parties. The MOA would be executed prior to the execution of a ROD for the Proposed Action.

The Proposed Action would not cause adverse effects on important geologic or geographic features. The Project would be constructed entirely within the valley, close to the I-15 corridor. Indirect impacts on cultural resources are addressed in Section 3.12: Cultural Resources; however, no Native American resources were identified in the indirect APE that would be adversely affected by the Proposed Action.

Decommissioning

The Applicant would limit reclamation and decommissioning activities to previously disturbed areas and existing access roads to the extent practicable. Consistent with a Site Restoration Plan, the Applicant would perform restoration and revegetation of the Project site. Impacts on Native American issues of concern would be reduced, as perennial plants and animals would be allowed to return over time,

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although it could take decades to a century or more given the level of disturbance associated with the Proposed Action. Although the Project site would not fully recover the diversity present under existing conditions, adverse effects would not occur because the culturally important species are common and accessible throughout the region.

Residual Effects

The Proposed Action would result in the loss of some common but culturally important plants and the loss of some habitat for culturally important wildlife species; however, these resources of concern are abundant in the region, including in the areas adjacent to the Project site, and do not represent a permanent loss of resources. Impacts would not be adverse. Once the Project is decommissioned, plant species and wildlife habitat would have the opportunity to repopulate the area, although the current diversity of species would not return. Given the availability of the resources nearby, residual impacts would be minimal.

Cumulative Effects

Cumulative projects could affect known and unknown TCPs, resulting in a cumulative loss of resources considered by local tribes to be significant. Many cumulative projects in the area, including the Proposed Action, would involve vegetation removal or changes to the existing habitats, which could cumulatively affect the populations of plant and game species important to Native Americans. Due to the presence of similar habitat types in the region, the cumulative loss of culturally important vegetation and animal species would not be substantial. The Proposed Action's contribution to the cumulative loss of known and unknown TCPs would be minimized with implementation of MMs CR-1 and CR-2, which require the avoidance of known TCPs and handling procedures for the discovery of cultural resources, as well as cultural resources worker awareness training.

All Mowing Alternative

The All Mowing Alternative would utilize mowing to prepare the development areas rather than traditional development methods. Mowing would result in less loss of culturally important plants during Project construction, as vegetation would be trimmed to a minimum of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters) under justifiable circumstances. Effects on culturally important plants would be reduced under this alternative relative to the Proposed Action. Mowing would allow for desert tortoise reintroduction, which would reduce effects on tortoises resulting from Project construction and O&M. The effects on Native American areas of concern associated with the All Mowing Alternative would not be adverse, as described for the Proposed Action.

Residual effects on culturally important plants would be less than those analyzed for the Proposed Action.

Cumulative impacts would be similar to those of the Proposed Action, with some reduction in the potential contribution to cumulative effects through the use of mowing. The contribution to the cumulative loss of TCPs would be minimized with implementation of the same mitigation measures.

Hybrid Alternative

The Hybrid Alternative would result in mowing of approximately 65 percent of the Project site, which would minimize the loss of culturally important plants and reduce effects on desert tortoise. The effects on Native American areas of concern associated with the Hybrid Alternative would not be adverse, as described for the Proposed Action.

Residual effects on culturally important plants would be less than those analyzed for the Proposed Action.

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3.13 Native American Concerns

Cumulative impacts would be similar to those of the Proposed Action, with some reduction in the potential contribution to cumulative effects through the use of mowing. The contribution to the cumulative loss of TCPs would be minimized with implementation of the same mitigation measures.

No Action Alternative

The Project would not be built under the Under the No Action Alternative. No plant or animal resources of importance to the Southern Paiute would be affected by the Project and no construction, O&M, or decommissioning activities would occur.

Mitigation Measures

- MM CR-1: Establishment of Environmental Exclusion Areas (from Section 3.12: Cultural Resources)
- MM CR-2: Cultural Resources Monitoring and Mitigation Plan (from Section 3.12: Cultural Resources)

3.14 Old Spanish National Historic Trail

3.14.1 Affected Environment

Introduction

This section describes the regulations and baseline information related to the OSNHT. Supplemental information is provided in the *Manual 6280 Inventory and Impacts Analysis for the Old Spanish National Historic Trail* (Panorama Environmental, Inc. 2019f). According to the National Trails System Act of 1968, federal agencies must consider the effects of proposed actions on National Historic Trails (NHTs). In compliance with the BLM Manual 6280, Management of National Scenic and Historic Trails Under Study or Recommended as Suitable for Congressional Designation (2012), this EIS identifies the resources, qualities, values, associated setting, and primary uses that support the nature and purpose of the OSNHT. Other regulations and laws that pertain to the OSNHT are described in Appendix E. The BLM and NPS are co-administrators of the OSNHT.

Data Source

Potential effects on the OSNHT are assessed based on existing publications and data compiled by state and federal agencies and reports prepared for the Proposed Action. The following documents and data were reviewed: *Class III Cultural Resource Inventory of Approximately 11,050 Acres for the Gemini Solar Project* (Knight & Leavitt Associates 2019); Old Spanish National Historic Trail, Final Comprehensive Administrative Strategy (NPS and BLM 2017); Old Spanish National Historic Trail Feasibility Study and Environmental Assessment (NPS 2001); and Technical Report 17, Archaeology of the Old Spanish Trail/Mormon Road from Las Vegas, Nevada to the California Border (BLM 1990). Additional information was obtained from the National Trails Inventory Project, undertaken by the BLM under the American Recovery and Reinvestment Act of 2009 (AECOM 2012). The purpose of this project was to inventory selected segments of NHTs throughout the western United States to identify high-potential route segments and document associated visual resources and settings. The “California Crossing” through the Project was included in this study.

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3.14 Old Spanish National Historic Trail

Analysis Area

The general alignment of the OSNHT is contained within the valley in which the Project is located. NHTs do not exist as a single alignment or path, but rather as a network of alignments that, together, constitute a historic trail corridor. The 2017 Administrative Strategy for the OSNHT used a least-cost model to identify the likely route of the trail through the valley, which placed it along the California Wash (Figure 3.14-1); however, this alignment is not meant to represent a ROW, but rather a starting point for delineation of a corridor. Actual routes traveled likely varied considerably by year and by expedition. The analysis area, therefore, spans the entire Project area, including to the west where gen-tie lines connect into Crystal substation. It also includes the viewshed of the Project area, which contributes to the associated setting of the OSNHT corridor. The inventory and analysis area for the OSNHT was defined as the trail corridor within, and approximately 5 miles (8 kilometers) to the south of the Project area, where the corridor continues on BLM lands.

The inventory and analysis area is based on a geographic information system (GIS) “bare-earth” viewshed analysis from the Congressionally designated OSNHT corridor with views of the Project area. The 2017 Comprehensive Administrative Strategy’s least-cost alignment was used but included an approximately 5-mile corridor around it. The inventory and analysis area includes all of the OSNHT corridor on BLM-managed lands, where the Project site (including the Proposed Action and alternatives) is visible. The inventory and analysis area is shown in Figures 3.14-1 and 3.14-2.

One archaeological component of the OSNHT was identified for the “California Crossing” during the National Historic Trails Project work conducted in 2009 and 2010, Segment No. 50279 (AECOM 2012). This segment falls within the OSNHT corridor analyzed for the California Crossing. The inventory and analysis for the OSNHT addresses the visual resources, recreational experiences, historic and cultural settings, and natural resources that are important to the trail’s setting within the Project area.

Throughout this section and the EIS, the following definitions are used:

- **Old Spanish Trail:** The land route traveled by traders from 19th-century Mexico - today's New Mexico - and California. From 1829 to 1848, this trail was the shortest-known route from Santa Fe to Los Angeles, through red-rock mesas, below snow-capped peaks, and fording untamed rivers, following a loose network of Native American footpaths across the Colorado Plateau and Mojave Desert.
- **Old Spanish National Historic Trail:** Congressionally-designated corridor of the Old Spanish Trail, officially established as a national trail under the authorities of the National Trails System Act.
- **Old Spanish Trail Road:** Generally adjacent, but up to a mile to the east of the Congressionally-designated alignment of the OSNHT, is Old Spanish Trail Road. The road is not linked historically to the OSNHT, nor to historical events associated with the trail, but provides proximal access.

Baseline Description

Trail History in the Project Area

The Old Spanish Trail is a historical trade route that connected the northern New Mexico settlements of Santa Fe with those of Los Angeles, California. The trail was approximately 700 miles (1,127 kilometers) long and traversed mountains, canyons, and deserts. The trail was mostly used by pack trains from around

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1829 to 1848, which is defined as its period of significance. The Old Spanish Trail became the 15th NHT after Congress adopted Senate Bill 1946 and President George W. Bush signed the legislation in 2002.

The section of the OSNHT in the Project area, known as the “California Crossing,” is part of a north-south corridor that passes through the California Wash. According to Carlson (1974) “California Crossing denoted the place where the trail crossed the Muddy River... The trail moved southerly over a low mesa, before traversing the Muddy, and continued west to California Wash, which drains the west side of the Muddy Mountains and the east side of the Arrow Canyon Range.” One of the earliest expeditions along the Old Spanish Trail was led by Antonio Armijo, who blazed a trade route through this area in 1829. The alignment of that route may have been the California Wash, but no conclusive evidence has been found to confirm this association (AECOM 2012).

The California Crossing of the Old Spanish Trail represents one of the places where the trail split into two alternate routes. The trail segment through the Project area along the east fork in the California Wash is considered the older and original route. The route that continued along the west fork (to the west of the present-day I-15) was a later innovation that demonstrates the variability in the trail route. The east route was mapped as a fairly straight trace through the desert, in the California Wash, to the point where it merged with the Arrowhead Trail. The east route then dropped into the Las Vegas Valley near present-day Nellis Air Force Base. Trade caravans and the earliest wagon traffic likely took this route. The west fork of the Old Spanish Trail later became the dominant and primary route, and by the 1886 map of emigrant trails, the east route was only considered a secondary route (Steiner 1999). Most descriptions of the trail in this area, as well as most evidence that has been found of the trail, is along the west route, on the opposite side of I-15 from the Project. The two routes of the trail, as defined by Steiner, are shown on Figure 3.14-3. With later travels through the area, it is believed that the entire wash, probably along both the east and west forks, were used without a well-worn single path.

The National Historic Trails Project identified a 1,781-meter segment of the Old Spanish Trail, as shown in Figure 3.14-1, within the area of predictive modeling that placed the trail roughly along the California Wash in the Project area. The segment appeared to have well-sorted gravels along two faint ruts (a variable consistent with historic trails). It was not centered in the valley but elevated above it (AECOM 2012). The segment was identified as a Category NHT II: Documented and Evident with Minor Alteration at the time of the National Historic Trails Project inventory and is the only physical evidence of the east fork of the California Crossing. This segment was not identified during the 2018/2019 Class III cultural resources inventory for the Project as a segment of the Old Spanish Trail. Between the 2009/2010 work for the National Historic Trails Project (AECOM 2012) and the 2018/2019 Class III inventory for the Project, the route has been turned into a well-used modern two-track road. It still retains much of its essence of historic character. The identification of this segment validates the use of the Old Spanish National Historic Trail in the Project area.

The trip along the California Crossing of the Old Spanish Trail between Moapa (north of the Project area) and Las Vegas (south of the Project area) was called *jornada del muerte* (days’ journey of death) due to the lack of water through this area. Generally speaking, the distance between water along the routes was under 30 miles (48 kilometers); however, this stretch was 57 miles (92 kilometers) according to John C. Fremont’s account (McBride and Rolf 2001).

Setting of the Trail in the Project Area

The analysis unit (AU) for the California Crossing from the National Historic Trails Project (AECOM 2012) spanned 15 miles, all of which were on BLM lands. The north end started at an unnamed road off

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Valley of Fire Highway, just south of I-15. The trail corridor extended south to the Union Pacific railroad tracks adjacent to Nellis Dunes Special Recreation Management Area. The trail trace today is not evident according to the trail verification process undertaken for the National Historic Trails Project. There are multiple possibilities for the historic trail route within the AU, but all share the same location, setting, feeling, and association.

Features that contribute to the setting, feeling, and association of the OSNHT within the Project area that are evident today as they were at the time of primary use, include the expansive and unbroken landscape. The views of the Muddy Mountains, Dry Lake Range, and Arrow Canyon Range; the ephemeral washes; the open valley topography; and the desert vegetation all contribute the landscape. The area's topography and vegetation remain the dominant contributing elements to the setting, feeling, and association in the Project area, as they would still likely be recognizable to emigrants who traveled through this region during the historic period.

The non-contributing and incompatible features include I-15 to the west and north, and the network of two-track roads visible throughout the surrounding landscape. The interstate traffic is visible, although the road itself is not noticeable. The Moapa Travel Plaza is visible to the north. Large transmission structures within a nearby transmission corridor (adjacent and to the west of the corridor) are also visible from the AU. Since the time of the National Historic Trails Project inventory in the area, the 250-MW (and nearly 2,000-acre) Moapa Solar Project was built. The solar facility is located approximately 1.75 miles north of the Project area; thus, the OSNHT corridor in the Project area. It is visible as a massive black modern form under the Arrow Canyon Range and is visible when looking north from the OSNHT in the Project area due to its superior position on the tablelands (visible in several simulation for Section 3.10: Visual Resources in Appendix D). These features slightly to moderately detract from the setting's natural integrity, depending on the direction of view. Views to the north and west are more impacted than those to the south and east, which remain highly intact.

As noted in the National Register Bulletin 15, published by the NPS, "All properties change over time. It is not necessary for a property to retain all its historic and physical features or characteristics. The property must retain; however, the essential physical features that enable it to convey its historic identity... A property that is significant for its historic association is eligible if it retains the essential physical features that made up its character or appearance during the period of its association with the important event, historical pattern, or person(s). If it is a site (such as a treaty site) where no material culture remains, the setting must be intact." The California Crossing of the OSNHT is an illustration of this scenario.

Nature, Purpose, and Primary Uses of the Trail

The nature, purpose, and primary uses of the OSNHT in the Project area is to offer "exceptional opportunities for the public to enjoy and appreciate both the natural and cultural environment," including providing a scenic experience, a high-quality recreation experience, and the opportunity to share vicariously the experience of the original users. A segment of the OSNHT through the Project area from Valley of Fire Road, south, is identified as the "California Crossing" High Potential Route Segment (HPRSEG) in the 2017 Old Spanish National Historic Trail Final Comprehensive Administrative Strategy (NPS and BLM 2017). HPRSEGs are those segments of an NHT that afford high-quality recreation experiences along a portion of the route having greater-than-average scenic values or affording an opportunity to share vicariously the experience of the original users of a historic route. The HPRSEG is shown in Figure 3.14-1.

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3.14.2 Environmental Consequences

Analysis Methods and Criteria for Assessing Level of Impacts

BLM Manual 6280 requires an inventory of the visual resources, historic resources, historic and cultural setting, recreational resources, and natural resources of NHTs, and requires an assessment of a project's impacts on the resources that are important to the setting of the trail. This section describes each of the resources along the OSNHT and the impacts that the Proposed Action and alternatives would have on them. *The Manual 6280 Inventory and Impacts Analysis for the Old Spanish National Historic Trail* (Panorama Environmental, Inc. 2019e) details the methodology used for the inventory and analysis. Impacts are assessed for both the OSNHT and the Old Spanish Trail Road. The Old Spanish Trail Road is not historically associated with the Old Spanish Trail, but it is likely used by modern-day travelers to experience the trail and falls within the OSNHT corridor in the Project area.

Proposed Action

Construction and Operation/Maintenance

Nature, Purpose, and Primary Uses of the Trail. The nature, purpose, and primary uses of the OSNHT in the Project area are to offer “exceptional opportunities for the public to enjoy and appreciate both the natural and cultural environment,” including providing a scenic experience, a high-quality recreational experience, and the opportunity to share vicariously the experience of the original users in this area, known as the “jornada del muerte.”

Construction and O&M of the Project would result in modern built features across the HPRSEG of the OSNHT corridor in the Project area. The development of the solar facility would substantially interfere with the natural and cultural environment due to the degree of modern change that it would introduce into the landscape of the valley. The construction and O&M of approximately 7,100 acres (2,873 hectares) would disrupt the setting of the trail with substantial modern intrusion that is discordant and incompatible with the setting of the OSNHT. The known segment of the trail, as identified in the National Historic Trails Project (AECOM 2012), falls within development area B. The segment is significant based on its setting, which would be lost by the surrounding development of solar arrays and roads, although the segment may be preserved under the MOA and HPTP currently in development.

The Project would substantially interfere with the overall setting of the OSNHT corridor in the California Crossing HPRSEG. The Proposed Action includes the removal of all landscape vegetation within the development areas (totally 7,100 acres [2,873 hectares]), and disking and rolling of the land, which would substantially alter the underlying landscape and the overall setting of the valley.

The Applicant consulted with the OSTA to understand their concerns with the Project. While any development in the valley could be considered substantial interference with the nature, purpose, and primary uses of the OSNHT, the OSTA is most interested in preserving the history and expanding the educational opportunities for use of the trail across the greater region. The Applicant has defined voluntary compensatory mitigation (MM NHT-1) in coordination and consultation with the OSTA. The mitigation does not reduce adverse effects as it does not preserve the setting along the trail.

Each of the following sections describes the impacts of the various components of the natural and cultural setting of the OSNHT corridor in the Project Area, per the BLM Manual 6280 requirements.

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Visual Resources. The OSNHT segment within the Project area is located within a desert basin, bounded by the Dry Lake Range directly to the west and the Muddy Mountains to the east. The topography in the area is generally flat, and the area around the trail segment in the inventory area is expansive and open. Various braided ephemeral washes exist within and around the inventory area. The creosote-white burrobush vegetation community covers the majority of the Project area.

Viewer sensitivity is high for the Project area due to its location within the OSNHT corridor. Visual impacts from the Proposed Action were found to range from low to high, depending on viewer position around the Project area (Panorama Environmental, Inc. 2019i). Scenic quality in the area would be affected by the presence of the manmade elements of the Project, typically in the middleground views (that is, views 0.5 to 5 miles [0.8 to 8 kilometers] away). Because the OSNHT corridor extends through the Project site, where a viewer is within 0 to 0.5 mile of the Project, visual impacts would be high.

The relatively low profile of the facility (less than 15 feet [4.6 meters] in height for most features) as well as the levelness of the topography across large expanses minimize the visibility of the facility from distances south of the Project area within the OSNHT corridor, as shown in visual simulations from locations up to 5 miles south of the Project site within the OSNHT corridor (see *The Manual 6280 Inventory and Impacts Analysis for the Old Spanish National Historic Trail* (Panorama Environmental, Inc. 2019f)). The gen-tie line would provide the largest incompatible visual impact on the corridor due to the height and mass of these features.

Implementation of MMs VR-1 and VR-2, which would require integration of visual design elements into the Project's final design and implementation of a surface treatment for Project structures, would reduce the visual contrast; however, because since the Project lies entirely within the OSNHT corridor, there is no way to avoid the visual impacts. Impacts would remain adverse.

Historic Resources. The Class I inventory for cultural resources resulted in the identification of one previously recorded cultural resource associated with the OSNHT on BLM land, a recommended non-contributing segment of the Old Spanish Trail/Mormon Wagon Road to the west of I-15 near Crystal Substation (Knight & Leavitt Associates 2019). The results of the Class III cultural resources survey indicated that the non-contributing segment of the Old Spanish Trail/Mormon Wagon Road was destroyed in the area where it had been previously recorded, likely during construction of the Crystal Substation. The BLM is seeking concurrence with the SHPO on the finding that the segment is a non-contributing element. The Project would not have impacts on this resource as it is recommended ineligible for listing in the NRHP.

The contributing NRHP-eligible segment of the Old Spanish Trail is located within a solar development area. MM CR-1 requires the CRRMP to identify the procedures for data recovery and preservation of the 5,843-foot (1,781-meter) length of the "California Crossing" of the Old Spanish Trail in development area B. However, this measure would not mitigate the overall effects of the Project to the OSNHT corridor's setting, nature, primary purpose, and use.

No other contributing traces or segments of the NRHP-eligible Old Spanish Trail/Mormon Wagon Road were identified anywhere in the Project area during the intensive Class III cultural resources survey. No known NRHP-eligible traces were found within a 5-mile (8-kilometer) radius area of indirect effects.

Historic and Cultural Setting. The historic and cultural setting includes the features that contribute or do not contribute to the character of the OSNHT within the Project area that are evident today, as shown

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in Table 3.14-1. The Proposed Action would include solar development through the OSNHT corridor. The historic setting of the OSNHT is already slightly diminished by modern intrusions, including the Moapa Solar Project, the Moapa Paiute Travel Plaza, roads, I-15, and existing transmission lines. The modern intrusions are not so visible as to completely diminish the historic setting of the OSNHT. The area’s topography, vegetation, and views of the nearby mountains, particularly to the east, are reminiscent of the natural environment that would have been encountered by emigrants. Views to the east of the valley, toward the Muddy Mountains, retain a high degree of historic integrity with no modern intrusion. Views to the west and north retain moderate historic integrity with some modern intrusion.

Table 3.14-1 Inventory of Contributing and Non-Contributing Features to Historic Character of the California Crossing OSNHT HPRSEG in the Project Area and Impacts of the Proposed Action on Contributing Character

Characteristic	Feature	Contributing to Character	If Non-Contributing, Compatible?	Description	Impacts from Project
Terrain	Muddy Mountains	Yes	N/A	This range would be a prominent view for emigrants traveling along the trail corridor.	The Proposed Action would not alter the appearance of the Muddy Mountains. It would be confined to the valley floor, with maximum equipment height around 15 feet. However, because the Project is within the trail corridor, views to the Muddy Mountains from within the solar facility would be obstructed and impacts would be adverse.
Terrain	Dry Lake Range	Yes	N/A	This range would be a prominent view for emigrants traveling within the trail corridor.	Similar to that described for the Muddy Mountains.
Terrain	Arrow Canyon Range	Yes	N/A	This range would be a prominent view for emigrants traveling within the trail corridor.	Similar to that described for the Muddy Mountains.
Hydrology and Landform	Ephemeral washes, land contours	Yes	N/A	Multiple braided, intermittent washes flow northward through the Project area and connect into the California Wash. They would have been part of the landscape during historical use of the trail corridor.	The Proposed Action would result in the alteration of drainages and land form and contour due to (1) filling of drainages through disk and roll, which would churn and compact soils; and (2) changes in drainage patterns from landform alterations.
Vegetation	Native vegetation community	Yes	N/A	Vegetation would be similar to that observed by emigrants traveling along the terrain.	The Project would result in the removal of all vegetation within the

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Characteristic	Feature	Contributing to Character	If Non-Contributing, Compatible?	Description	Impacts from Project
					solar development areas through disk and roll.
Circulation	Old Spanish Trail Road	No	Yes	This road falls within the Trail Corridor. This road is not linked historically to the OSNHT or to historical events associated with the trail, but it is compatible with the trail as a minor developed route.	N/A
Development	Moapa Paiute Travel Plaza	No	No	This travel plaza includes a gas station, café, convenience store, and casino. It is now visible to the north along the trail corridor as well as within the corridor.	N/A
Development	Moapa Solar Project	No	No	This 250-MW AC solar project is located on approximately 2,000 acres (809 hectares) on the Moapa River Indian Reservation. It was built recently and is now visible from within the trail corridor when looking north. It is approximately 1.75 miles from the Project area within the trail corridor.	N/A
Development	Transmission Line Corridors	No	No	A transmission corridor with three lines on lattice towers is located adjacent and to the west of the trail corridor. It is particularly visible from the trail corridor to the south of the Project area.	N/A

The Proposed Action would have an adverse effect on the historic setting of the OSNHT across the valley through introduction of the solar facility on approximately 7,100 acres (2,873 hectares) of undeveloped land. The characteristics of historic landscape, including views to the mountains, hydrology, land contours, and native vegetation, would all be altered by the Proposed Action.

Recreational Resources. Dispersed recreation found within the trail corridor includes various OHV uses, and potentially camping, hiking, and shooting. Recreationalists could travel through the Project area along Old Spanish Trail Road on their way to visit various sites in the Muddy Mountains or Valley of Fire State Park. These recreational opportunities could either be related or unrelated to the OSNHT.

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Recreational access within the OSNHT corridor in the Project area would be substantially restricted by Project construction and O&M. OSNHT users could use Old Spanish Trail Road to experience the OSNHT, given the relative ease of access along the road through the corridor. Under the Proposed Action, access to portions of Old Spanish Trail Road would be permanently severed, specifically through development areas D and E, resulting in adverse impacts on recreationalists utilizing Old Spanish Trail Road for access and travel opportunities. Implementation of MM REC-1 from Section 3.2: Recreation would reroute Old Spanish Trail Road to either the California Wash (for users on foot) or the Arrowhead Trail (for users in vehicles) to maintain the connection to Valley of Fire Road, maintaining access through the valley for recreational users.

The Proposed Action would also impact the recreational experience of OSNHT users. The solar facility would physically and visually detract from the vicarious experience that is supposed to be associated with an HPRSEG. The rerouting of Old Spanish Trail Road to the California Wash and/or to Arrowhead Trail per MM REC-1 would have a moderate adverse effect on the recreational experience. Rerouting would take users off the straight access road and move them to either the wash or another road farther away. The setting of the Arrowhead Trail is very similar to the setting of Old Spanish Trail Road, and it would place travelers farther away from the solar development, reducing the visual impacts of the development. Use of Old Spanish Trail Road is sparse. Dispersed recreationalists in the Project area, such as hikers, shooters, and OHV users, might also be sensitive to visual contrast in the landscape during all phases of the Project; however, these uses are low in the Project area and not likely trail-related. Implementation of MMs VR-1, VR-2, VR-4, and VR-5 from Section 3.10: Visual Resources would reduce visual contrast and would reduce some impacts on the recreational experience but would not minimize adverse effects of the Project on recreational experiences associated with the OSNHT.

Natural Resources. Natural resources important to the trail setting include the mountains, vegetation, soils, and wildlife found in the vicinity of the OSNHT. The Proposed Action would involve substantial alteration of the approximately 7,100 acres (2,873 hectares) of native vegetation that comprise the natural setting and landscape of the OSNHT. It would change the vegetation and wildlife present in the area, including desert tortoises. Impacts on natural resources associated with the trail would be considered adverse for the Proposed Action, as vegetation would be removed to construct the facility.

Decommissioning

Decommissioning would involve the removal of the facility and the restoration of the area. Due to the extensive soil and ground alteration involved with the Proposed Action, restoring native vegetation and wildlife, natural drainages, and other features that contribute to the setting of the OSNHT could take a century or longer. The site is not expected to ever fully recover to pre-disturbance conditions; the most that could be expected is reestablishment of some cover of perennial plants. Overall impacts of the Proposed Action on the setting would be reduced at decommissioning, as the incompatible manmade elements of the Project within the OSNHT corridor would be removed. The permanent effects on the localized elements of the setting (vegetation, soils, wildlife, hydrology) would remain adverse.

Residual Effects

The Proposed Action would have adverse impacts on the OSNHT corridor as the corridor encompasses the entire Project area, which would be considered a substantial interference with nature, purpose, and primary uses of the trail. Per BLM Manual 6280, Section 5.3.B.2, for adverse impacts to NHTs where an NHT Management Corridor has not been established in an RMP, alternative locations for the Project were considered. The entire lease area is within the OSNHT corridor, and thus cannot avoid impacts. An

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analysis was performed to identify other land opportunities within southern Nevada for the Project, but opportunities for similar acreage on disturbed land with fewer natural resource conflicts do not exist.

Cumulative Effects

The transmission line cumulative projects (e.g., #21 TransWest Express Transmission Line) would also be constructed within the line of sight of, or across the California Crossing from, the Congressionally designated OSNHT. Views from the OSNHT along some segments would be changed from generally natural to a landscape with visible utilities, including solar facilities and transmission lines. Some NRHP-eligible segments of the trail might be present and could be degraded by construction of the cumulative projects. The cumulative effect on the OSNHT would be adverse. The Proposed Action would involve construction of a solar facility within the OSNHT corridor, resulting in a change in the historic setting of the trail. The Proposed Action would have adverse effects on the OSNHT including substantial interference with the nature, purpose, and primary uses of the trail, compounding cumulative impacts.

All Mowing Alternative

Construction and Operation/Maintenance

Nature, Purpose, and Primary Uses of the Trail. The All Mowing Alternative would similarly substantially interfere with the nature, purpose, and primary uses of the trail as the Proposed Action. Construction and O&M of the Project would result in modern built features across the HPRSEG of the OSNHT corridor in the Project area. The development of the solar facility would have adverse effects on the natural and cultural environment due to the degree of modern change that it would introduce into the landscape of the valley during the construction and O&M of the Project. The construction and O&M of approximately 7,100 acres (2,873 hectares) would disrupt the setting of the trail with substantial modern intrusion that would be discordant and incompatible with the setting of the OSNHT. The known segment of the trail, as identified in the National Historic Trails Project (AECOM 2012), falls within development area B. The segment is significant based on its setting, which would be lost by the surrounding development of solar arrays and roads, although the segment may be preserved under the MOA and HPTP being developed.

The All Mowing Alternative differs from the Proposed Action in that it preserves several elements of the natural landscape important to the OSNHT setting that are removed by the Proposed Action. Native vegetation would be maintained within the solar facility, although approximately 200 acres (81 hectares) would be removed for the installation of roads, buildings, and other facilities out of the total 7,115 acres (2,879 hectares) for the facility (less than 3 percent). Natural washes and drainage courses would also be preserved under this alternative. Soil disturbance would be minimized, and the All Mowing Alternative would allow for native fauna to return to the site after construction were completed. While the underlying landform, including vegetation, soils, and wildlife, would be maintained, the Project would introduce buildings and modern structures that would adversely affect the corridor, altering access and historic views and the primary uses for the 30 years of the ROW grant.

Since the ROW grant includes removal of the solar facility and site restoration, and full restoration to pre-Project conditions, the nature, purpose, and primary uses of the trail would be restored after decommissioning in 30 years, removing the substantial interference introduced by the Project. Under this alternative, the BLM could still manage the trail resources, qualities, values, and associated natural components of the settings within the solar development areas by maintaining native vegetation on site, minimized ground disturbance, avoiding any known or discovered archaeological segments of the trail (and potentially making them available to the public through the MOA and HPTP process under Section

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106), and intensively treating weeds. Once the facility is decommissioned, the nature, purpose and primary uses including the historic views and public access and enjoyment would be restored. Limited access along portions of the OSNHT corridor in areas outside the solar development areas would still be available to the public during the construction and O&M phases of the Project (such as between development areas A and B, B and D, and to the east of the Project site), but the access and enjoyment of the entire corridor would be impacted for the 30 years.

Visual Resources. The All Mowing Alternative would have the same impact on visual resources as described for the Proposed Action, as it includes the same manmade elements of the Project that would be placed within the OSNHT corridor. Implementation of MMs VR-1 and VR-2, which would require integration of visual design elements into the Project’s final design and implementation of a surface treatment for Project structures, would reduce the visual contrast; however, because the Project lies entirely within the OSNHT corridor, there is no way to avoid the visual impacts. Impacts would remain adverse.

Historic Resources. The All Mowing Alternative would have the same impacts on historic resources as the Proposed Action. The contributing NRHP-eligible segment of the Old Spanish Trail is located within a solar development area that is also part of the All Mowing Alternative. A MOA and HPTP are being developed to address adverse impacts. MM CR-2 requires the CRRMP to identify the procedures for preservation of the 5,843-foot (1,781-meter) length of the “California Crossing” of the Old Spanish Trail in development area B. However, this measure would not mitigate the overall effects of the Project on the OSNHT corridor’s setting, nature, primary purpose, and use. The All Mowing Alternative minimizes ground and soils disturbance; thus, if other undiscovered segments of the Old Spanish Trail were located within the Project area, they would be more likely to be preserved than under the Proposed Action.

Table 3.14-2 Inventory of Contributing and Non-Contributing Features to Historic Character of the California Crossing OSNHT HPRSEG in the Project Area and Impacts of the All Mowing Alternative on Contributing Character

Characteristic	Feature	Contributing to Character	If Non-Contributing, Compatible?	Description	Impacts from Project
Terrain	Muddy Mountains	Yes	N/A	This range would be a prominent view for emigrants traveling along the trail corridor.	The All Mowing Alternative would not alter the appearance of the Muddy Mountains. It would be confined to the valley floor, with maximum equipment height around 15 feet. However, because the Project is within the trail corridor, views to the Muddy Mountains from within the solar facility would be obstructed and impacts would be adverse.
Terrain	Dry Lake Range	Yes	N/A	This range would be a prominent view for emigrants traveling within the trail corridor.	Similar to that described for the Muddy Mountains.

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Characteristic	Feature	Contributing to Character	If Non-Contributing, Compatible?	Description	Impacts from Project
Terrain	Arrow Canyon Range	Yes	N/A	This range would be a prominent view for emigrants traveling within the trail corridor.	Similar to that described for the Muddy Mountains.
Hydrology and Landform	Ephemeral washes, land contours	Yes	N/A	Multiple braided, intermittent washes flow northward through the Project area and connect into the California Wash. They would have been a part of the landscape during historical use of the trail corridor.	The All Mowing Alternative would have minimal impacts on the underlying hydrology and landform. The facility would be constructed with as little disturbance to the existing contours and hydrology as possible. These existing features would be maintained under the solar panels for the life of the Project.
Vegetation	Native vegetation community	Yes	N/A	Vegetation would be similar to that observed by emigrants traveling along the terrain.	The Project would be built maintaining existing vegetation. Vegetation appearance could be altered, as it would be trimmed to 24 inches but not less than 18 inches. Most vegetation, however, is naturally under 24 inches in height. Native fauna would be able to reoccupy the solar development area after completion of construction.
Circulation	Old Spanish Trail Road	No	Yes	This road falls within the Trail Corridor. This road is not linked historically to the OSNHT or to historical events associated with the trail, but it is compatible with the trail as a minor developed route.	N/A
Development	Moapa Paiute Travel Plaza	No	No	This travel plaza includes a gas station, café, convenience store, and casino. It is now visible to the north along the trail corridor as well as within the corridor.	N/A
Development	Moapa Solar Project	No	No	This 250-MW AC solar project is located on approximately 2,000 acres (809 hectares) on	N/A

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Characteristic	Feature	Contributing to Character	If Non-Contributing, Compatible?	Description	Impacts from Project
				the Moapa River Indian Reservation. It was built recently and is now visible from within the trail corridor when looking north. It is approximately 1.75 miles from the Project area within the trail corridor.	
Development	Transmission Line Corridors	No	No	A transmission corridor with three lines on lattice towers is located adjacent and to the west of the trail corridor. It is particularly visible from the trail corridor to the south of the Project area.	N/A

Historic and Cultural Setting. Impacts to the historic and cultural setting under the All Mowing Alternative would be adverse; however, some elements of the setting would be maintained under this alternative, as opposed to the Proposed Action under which all elements would be removed. While elements such as natural washes, vegetation, and wildlife could be retained under this alternative, the panels would cover the views of these landscape elements, substantially interfering with a viewer’s experience. Table 3.14-1 summarizes the impacts of the All Mowing Alternative on the OSNHT’s contributing features.

Recreational Resources. Impacts to recreation, including access and experience, would be the same for the All Mowing Alternative as for the Proposed Action. Recreational access within the OSNHT corridor in the Project area would be substantially restricted by Project construction and O&M. OSNHT users could use Old Spanish Trail Road to experience the OSNHT, given the relative ease of access along the road through the corridor. Under the All Mowing Alternative, access to portions of Old Spanish Trail Road would be permanently severed (although for a shorter distance than for the Proposed Action), specifically through development areas D and E, resulting in adverse impacts on recreationalists utilizing Old Spanish Trail Road for access and travel opportunities. Implementation of MM REC-1 from Section 3.2: Recreation would reroute Old Spanish Trail Road to either the California Wash (for users on foot) or the Arrowhead Trail (for users in vehicles) to maintain connection to Valley of Fire Road, maintaining access through the valley for recreational users. Implementation of MMs VR-1, VR-2, VR-4, and VR-5 from Section 3.10: Visual Resources would reduce visual contrast as well as some impacts on the recreational experience; however, it would not minimize adverse effects of the Project on recreational experiences associated with the OSNHT.

Natural Resources. Natural resources important to the trail setting include the mountains, vegetation, soils, and wildlife in the vicinity of the OSNHT. The All Mowing Alternative would have reduced impacts to natural resources compared with the Proposed Action. Vegetation, soils, and wildlife would be maintained on site, including desert tortoise.

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Decommissioning

Decommissioning would involve the removal of the facility and restoration of the area. The All Mowing Alternative would involve construction of the facility by minimizing ground disturbance. Vegetation, hydrology, soils, and topography would remain in place during construction and throughout Project operation. Once the solar facility was removed, the site could be restored within a few years.

Approximately 3 percent of the site would be disturbed for construction of roads and facilities. The setting, feel, and association of the Congressionally-designated OSNHT corridor and the NRHP-eligible contributing segment of the Old Spanish Trail would be restored after decommissioning under this alternative, in roughly 35 years (after a few years of restoration), and substantial interference with the nature, purpose, and primary uses of the trail would no longer occur.

Residual Effects

Residual effects would be the same as those stated for the Proposed Action. The All Mowing Alternative reduces some effects associated with natural landscape resources important to the trail's setting; however, it would remain adverse due to the presence of solar field structures in the OSNHT corridor, as the corridor encompasses the entire Project area. The residual effects would last approximately 35 years (30 year of the ROW and then approximately 5 years thereafter for restoration).

Cumulative Effects

Cumulative impacts would be the same as those described for the Proposed Action. The All Mowing Alternative would involve construction of a solar facility within the OSNHT corridor, resulting in a change in the historic setting of the trail and a substantial interference with the nature, purpose, and primary uses of the trail during Project construction and O&M. The All Mowing Alternative would have adverse effects on the OSNHT, compounding cumulative impacts during the construction and O&M phases.

Hybrid Alternative

Construction and Operation/Maintenance

Nature, Purpose, and Primary Uses of the Trail. The Hybrid Alternative would similarly substantially interfere with the nature, purpose, and primary uses of the trail as the Proposed Action. Construction and O&M of the Project would result in modern built features across the HPRSEG of the OSNHT corridor in the Project area. The development of the solar facility would have adverse effects on the natural and cultural environment due to the degree of modern change that it would introduce in the landscape of the valley. The construction and O&M of approximately 7,100 acres (2,873 hectares) would disrupt the setting of the trail with substantial modern intrusion that is discordant and incompatible with the setting of the OSNHT. The known segment of the trail, as identified in the National Historic Trails Project (AECOM 2012), falls within development area B. The segment is significant based on its setting, which would be lost by the surrounding development of solar arrays and roads, although the segment may be preserved under the MOA and HPTP being developed.

The Hybrid Alternative includes traditional development over 35 percent of the Project site and mowing over the remaining 65 percent of the site. Where traditional development methods are used, impacts would be same as described for the Proposed Action. Natural landscape elements, including vegetation, hydrology, soils, and wildlife, would be substantially altered. For the 65 percent of the site constructed and maintained using mowing, native vegetation would be maintained within the mowed development areas. Natural washes, soils, and drainage courses would also be preserved on 65 percent of the site.

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While the underlying landform, including vegetation, soils, and wildlife would be maintained on 65 percent of the site, the Project would introduce buildings and modern structures and substantial ground disturbance on 35 percent of the site that would adversely affect the OSNHT corridor, altering access and historic views for up to a century or more after decommissioning. MM VG-2 requires the use of drive and crush instead of disk and roll, which would reduce impacts to soils, native vegetation, and hydrology, similar to the All Mowing Alternative. This mitigation measures could allow the site to be completely restored after decommissioning, similar to the All Mowing Alternative. It would allow for the BLM to manage the trail resources, qualities, values, and associated natural components of the settings within the solar development areas by maintaining native vegetation on site, minimized ground disturbance, avoiding any known or discovered archaeological segments of the trail (and potentially making them available to the public through the MOA and HPTP process under Section 106), and intensively treating weeds. The access and enjoyment of the entire corridor, like for the All Mowing Alternative, would still be impacted for the 30 years.

The Applicant-proposed mitigation (MM NST-1) would apply to this alternative but would not reduce adverse effects as it does not preserve the setting along the trail.

Visual Resources. The Hybrid Alternative would have the same impact on visual resources as described for the Proposed Action, as it includes the same manmade elements of the Project that would be placed within the OSNHT corridor. Implementation of MMs VR-1 and VR-2, which would require integration of visual design elements into the Project's final design and implementation of a surface treatment for Project structures, would reduce the visual contrast; however, because the Project lies entirely within the OSNHT corridor, there is no way to avoid the visual impacts. Impacts would remain adverse.

Historic Resources. The Hybrid Alternative would have the same impacts on historic resources as the Proposed Action. The contributing NRHP-eligible segment of the Old Spanish Trail is located within a solar development area that is also part of the All Mowing Alternative. A MOA and HPTP are being developed to address adverse impacts. MM CR-2 requires the CRRMP to identify the procedures for preservation of the 5,843-foot (1,781-meter) length of the "California Crossing" of the Old Spanish Trail in development area B. However, this measure would not mitigate the overall effects of the Project on the OSNHT corridor's setting, nature, primary purpose, and use. The Hybrid Alternative minimizes ground and soils disturbance over 65 percent of the site; thus, if other undiscovered segments of the Old Spanish Trail were located within mowed areas (such as the one known site), they would be more likely to be preserved than under the Proposed Action.

Historic and Cultural Setting. Impacts to the historic and cultural setting under the Hybrid Alternative would be adverse, but some elements of the setting would be maintained under this alternative where the site is mowed, compared with the Proposed Action where all elements would be removed. While elements such as the natural washes, vegetation, and wildlife could be retained on 65 percent of the solar development areas in this alternative, the panels would cover the views of these landscape elements, substantially interfering with a viewer's experience. Impacts to the historic and cultural setting of the OSNHT would be adverse.

Recreational Resources. Impacts to recreation, including access and experience, would be the same for the Hybrid Alternative as for the Proposed Action. Recreational access within the OSNHT corridor in the Project area would be substantially restricted by Project construction and O&M. OSNHT users could use Old Spanish Trail Road to experience the OSNHT, given the relative ease of access along the road through the corridor. Access to portions of Old Spanish Trail Road would be permanently severed,

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3.14 Old Spanish National Historic Trail

specifically through development areas D and E, resulting in adverse impacts on recreationalists utilizing Old Spanish Trail Road for access and travel opportunities. Implementation of MM REC-1 from Section 3.2: Recreation would reroute Old Spanish Trail Road to either the California Wash (for users on foot) or the Arrowhead Trail (for users in vehicles) to maintain connection to Valley of Fire Road, maintaining access through the valley for recreational users. Implementation of MMs VR-1, VR-2, VR-4, and VR-5 from Section 3.10: Visual Resources would reduce visual contrast as well as some impacts on the recreational experience, but would not minimize adverse effects of the Project on recreational experiences associated with the OSNHT.

Natural Resources. Natural resources important to the trail setting include the mountains, vegetation, soils, and wildlife found in the vicinity of the OSNHT. The Hybrid Alternative would have reduced impacts to natural resources compared with the Proposed Action. Vegetation, soils, and wildlife would be maintained on site over 65 percent of the Project area, including desert tortoise.

Decommissioning

Decommissioning would involve the removal of the facility and the restoration of the area. The Hybrid Alternative would involve construction of the facility using traditional methods over approximately 35 percent of the facility and mowing over 65 percent of the facility. Vegetation, hydrology, soils, and topography would remain in place during construction and throughout Project operation within 65 percent of the site (including where the one segment of the trail was identified). While 65 percent of the site could be restored to pre-Project conditions quickly, the remaining 35 percent could take over a century or longer to recover. MM VG-2 requires that the 35 percent of the site constructed by disk and roll be constructed by drive and crush, preserving the native vegetation roots, soils, and washes. Over 30 years, this alternative would be similar to the All Mowing Alternative. The setting, feel, and association of the Congressionally-designated OSNHT corridor and the NRHP-eligible contributing segment of the Old Spanish Trail could be restored after decommissioning under this alternative, and substantial interference with the nature, purpose, and primary uses of the trail would no longer occur.

Residual Effects

Residual effects would be the same as those stated for the Proposed Action. The Hybrid Alternative reduces some effects associated with natural landscape resources important to the trail's setting but would still be adverse due to the presence of the solar field structures in the OSNHT corridor, as the corridor encompasses the entire Project area. With MM VG-2, the residual effects from substantial interference with the nature, purpose, and primary uses of the trail would last approximately 35 years (30 year of the ROW and then approximately 5 years thereafter for restoration).

Cumulative Effects

Cumulative impacts would be the same as those described for the Proposed Action. The Hybrid Alternative would involve construction of a solar facility within the OSNHT corridor, resulting in a change in the historic setting of the trail, and a substantial interference with the nature, purpose, and primary uses of the trail during Project construction and O&M. The Hybrid Alternative would have adverse effects on the OSNHT during the 30-year O&M of the facility, compounding cumulative impacts.

No Action Alternative

The Project would not be built under the No Action Alternative. As a no-development alternative, the No Action Alternative would result in no changes to the OSNHT resources described above.

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3.14 Old Spanish National Historic Trail

Mitigation Measures

- MM REC-1: Old Spanish Trail Road and Route 167 Reroute (from Section 3.2: Recreation)
- MM VR-1: Visual Design Elements (from Section 3.10: Visual Resources)
- MM VR-2: Surface Treatment (from Section 3.10: Visual Resources)
- MM VR-4: Anti-Reflective Coating (from Section 3.10: Visual Resources)
- MM VR-5: Visual Construction Elements (from Section 3.10: Visual Resources)
- MM CR-2: Cultural Resources Monitoring and Mitigation Plan (from Section 3.12: Cultural Resources)
- MM NHT-1: Contribution to the Old Spanish Trail Association (from Section 3.14: Old Spanish National Historic Trail)

3.15 Socioeconomics and Environmental Justice

3.15.1 Affected Environment

Introduction

This section provides the baseline socioeconomic and demographic information for the Project region. Additional details are available in the *Socioeconomic and Environmental Justice Report* (Panorama Environmental, Inc. 2019h). Regulations that apply to the Project are provided in Appendix E.

Analysis Area

Workers needed for the Project would be living in (or would move to) surrounding communities within Clark County, primarily the Las Vegas metropolitan area. The analysis area for the socioeconomic analysis encompasses Clark County, Nevada, with a focus on Las Vegas. The analysis area for the environmental justice analysis encompasses 33 miles (53 kilometers) from the Project site.

Baseline Description

Socioeconomics

The Project site is located in a sparsely populated portion of Clark County northeast of the city of Las Vegas. Clark County accounts for approximately 75 percent of the population within the state of Nevada, as of 2016. Las Vegas is the largest city in Clark County, accounting for approximately 30 percent of the county's population. Population has been steadily increasing in Clark County and will continue to increase. Between 2010 and 2016, unemployment rates in Clark County and across Nevada increased. Within the same period, the highest percentage of jobs (approximately 30 percent) in Clark County were provided by the service industry. Average annual income growth rates were lower in Clark County than in the state of Nevada as a whole between 2010 and 2016, and poverty rates have increased in Nevada, in Clark County, and in Las Vegas. Poverty levels are determined based on several factors, including family size and composition (USCB 2016). Between 2010 and 2016, available housing increased by 6 percent in Clark County, but housing vacancy rates remained fairly constant, at approximately 13 to 14 percent, regionally and statewide. Owner occupancy of housing in Clark County decreased from 57 percent to 52 percent between 2010 and 2016 (USCB 2017).

Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires the federal government to focus attention on the environment and

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human health conditions of minority and low-income communities and calls on agencies to achieve environmental justice as part of its mission. Other neighboring communities within 33 miles (52 kilometers) of the Project site include Las Vegas, Moapa Town, Glendale, Moapa Valley, Overton, and the Moapa River Indian Reservation, as shown in Figure 2-1. The racial and ethnic composition as well as the percentage of low-income population within these communities is shown in Table 3.15-1.

The percentage of individuals that identify as American Indian or Alaska Native and low-income on the Moapa River Indian Reservation is meaningfully greater²¹ than that of the general population in Nevada or the United States as a whole.

3.15.2 Environmental Consequences

Introduction

Socioeconomics

IMPLAN modeling software was used with localized performance data for Clark County to determine the direct,²² indirect,²³ and induced²⁴ effects of the Project during construction and operation. Equipment purchases and use of property throughout the life of the Project were considered in determining the fiscal effects. The effects of the Project were estimated for a 30-year period through 2050, which includes construction and operation of the Project. These capital expenditures have been modeled over the course of the Project life cycle.

The modeling outcome and detailed methodology are provided in the *Gemini Solar Project Economic and Fiscal Impact Assessment* (Applied Analysis 2019), attached as an appendix to the *Socioeconomic and Environmental Justice Study* (Panorama Environmental, Inc. 2019h).

Environmental Justice

Consistent with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 11, 1994), this environmental justice analysis identifies and addresses any disproportionately high and adverse human health or environmental effects of the Project on minority and low-income populations.

²¹ A minority population is defined as one in which the percentage of minority individuals is both greater than 50 percent of the population and 20 percentage points higher than in the state. A low-income population is one in which the percentage of individuals with incomes below the poverty line exceeds 50 percent or is at least 20 percentage points greater than the average for the state.

²² Direct effects measure the effects of the specific impacting force being considered. Direct effects include payments for on-site construction activities, project engineering, and associated permits and mitigation expenditures.

²³ Indirect effects consider how other businesses respond to the impacting condition. The wages and salaries paid by a vendor or local supplier providing supplies to the solar project are considered an indirect impact.

²⁴ Induced effects measure the effects of consumer expenditures resulting from wage and salary payments sourced to an impacting condition. Induced effects capture the impacts of this spending as it ripples through the economy.

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Table 3.15-1 Race, Ethnicity, and Low-Income Populations in the Project Area – 2010

Location	Race ¹ (Percent)								Ethnicity (Percent)		Low-Income ³
	White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race	Two or More Races	Total Minority ²	Not Hispanic or Latino	Hispanic or Latino	
<i>United States</i>	72.4	12.6	0.9	4.8	0.2	6.2	1.9	26.6	83.7	16.3	14.4
<i>Nevada</i>	66.2	8.1	1.2	7.2	0.6	12.0	4.7	33.8	73.5	26.5	13.0
Clark County	60.9	10.5	0.7	8.7	0.7	13.5	5.1	39.1	68.5	31.5	12.9
Las Vegas	62.1	11.1	0.7	6.1	0.6	14.5	4.9	37.9	70.9	29.1	14.6
North Las Vegas	47.4	19.9	0.8	6.3	0.8	19.0	5.8	52.6	61.2	38.8	15.4 ⁴
Moapa Town	70.9	0.3	3.4	0.5	0.1	22.0	2.7	29.1	64.1	35.9	4.2 ⁴
Moapa Valley	91.6	0.2	0.8	0.5	0.4	3.6	2.9	8.4	89.6	10.4	-
Moapa River Indian Reservation ⁵	5.2	0.8	82.6	3.0	1.5	2.2	4.5	94.7	16.2	83.4	26.4

Notes:

Bold indicates a minority or poverty-level population that is meaningfully greater than the general population in the state.

1. Includes individuals who are Hispanic or Latino in ethnicity.
2. Includes black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, other non-white races, and mixed races.
3. Defined as below poverty level.
4. Data are from 2012, the year closest to 2010.
5. Data are from the 2012 to 2016 5-year estimates.

Source: (USCB 2017)

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3.15 Socioeconomics and Environmental Justice

Proposed Action

Construction

Employment. The workforce at the Project site during the 2.5- to 3-year construction period would average 500 to 700 workers, with a peak of up to 900 workers during the most intense construction activity. The majority of construction staff and workers would be expected to come from the labor pool present within Clark County, particularly the Las Vegas area. In-migration is expected to be minimal, but up to 25 percent of the work force (up to 225 workers) could migrate temporarily into the area from other counties or adjacent states during construction (DOE and BLM 2012). The unemployed population²⁵ within Clark County was approximately 156,515 persons in 2016 (USCB 2017), and the rate was even higher within Las Vegas. In 2016, a total of 56,669 workers were employed in the construction sector in Clark County (USCB 2017). The necessary work force could be accommodated locally, due to the level of unemployment and presence of construction workers. Construction of the Proposed Action would temporarily decrease the level of unemployment in Clark County. The effects on regional employment as a result of constructing the Proposed Action would be minor but beneficial.

Economics. The employment associated with construction of the Proposed Action would have beneficial effects beyond just labor income, most of which would be realized within Clark County. Including direct and induced effects, the total employment effect is estimated to be 3,826 job years,²⁶ which could equate to approximately 1,000 to 1,600 full-time-equivalent positions, depending on the overall construction schedule. Total compensation would be \$248.4 million and total output would be \$712.5 million through the end of the Proposed Action construction period. To the extent that workers would come from or work outside of Clark County, some of this effect would be realized in the workers' home counties. The effects on the regional economy as a result of constructing the Proposed Action would be beneficial.

Housing. Rental housing vacancy rates of approximately 10 percent (38,583 units in 2016) and availability of temporary accommodations such as hotels and motels in Clark County would accommodate the potential influx of workers (USCB 2017). The workers who migrate from other counties and states would occupy a nominal amount of the available vacant rental housing in Clark County. No substantial adverse effects on regional housing would occur.

Public Services. In 2016, the level of service for the Las Vegas Metropolitan Police Department, which is a joint city-county police force, was 1.5 officers per 1,000 population; the Clark County Fire Department had 0.9 firefighter per 1,000 population (USDOJ 2016, NDPS 2016). The level of service in 2016 for teachers per 1,000 population was 7.3 (NCES 2017). Construction activities would occur for approximately 2.5 to 3 years. The temporary influx of up to 225 out-of-county workers during this construction period would minimally affect the level of service for any public services.

Environmental Justice. The only minority and low-income population within 33 miles (52 kilometers) of the Project area is the population on the Moapa River Indian Reservation. As Native Americans, residents on the Reservation meet the criteria of a minority population. The population also meets the criteria of low-income. Any project-related impacts could affect this minority and low-income population. Construction would provide job opportunities for up to 900 people during the peak construction period. Most of these temporary workers would reside in the Las Vegas area. Native Americans are expected to comprise part of the workforce needed during construction. The Proposed Action would not

²⁵ For the segment of the population 16 years and over in the labor force.

²⁶ One job for one year is one "job year."

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disproportionately affect the minority and low-income population of Native Americans on the Moapa River Indian Reservation, but rather could provide jobs. The small influx of workers would not displace this minority and low-income population, as worker influx is expected to be into Las Vegas.

Adverse ecological, cultural, human health, economic, or social impacts are not anticipated to be disproportionately higher on the Moapa River Indian Reservation population. The Project is generally located more than 15 miles (24 kilometers) from the Reservation population and is not visible from the Reservation. The Project would alter an area of natural habitat; however, adverse effects on sensitive species would be minimized and mitigated to the extent possible. Economic impacts would be beneficial in the form of construction jobs; additionally, workers are likely to use the Moapa Paiute Travel Plaza to purchase food, daily supplies, and fuel, which would boost income of the Moapa Band of Paiutes.

Operation and Maintenance

Socioeconomics. Up to 19 permanent employees would be directly associated with operation of the Proposed Action, an additional 5 jobs would be indirectly created, and 14 jobs would be induced by to Project-related expenditures as a result of the Proposed Action (Applied Analysis 2019). The Project is expected to operate for at least 30 years. Assuming a similar 25-percent rate as for construction, up to five individuals could migrate into the area from other counties or adjacent states to fill the jobs. The increase in permanent jobs would minimally reduce unemployment in Clark County. The Proposed Action would require recurring maintenance, security, and other investments during operation. The ongoing activities at the Project site would generate annually recurring economic effects. The total employment effect in the county, including direct and induced effects, would be 38 jobs annually, with a total direct effect of \$3.3 million per year and total economic output of \$12.9 million per year. The effects on the regional economy as a result of constructing the Project would be beneficial. The effect on the housing market and public services from the permanent influx of up to five families (associated with the five jobs created and filled by the five individuals that could migrate into the area from other counties or adjacent states) would be negligible. No substantial effects on regional housing would occur.

Environmental Justice. Up to 19 permanent positions would be created during O&M of the Proposed Action, with those jobs lasting 30 years. Operation of the Proposed Action would only result in up to five families migrating into the area. The minority and low-income population of Native Americans in Moapa Town would not be displaced by these families. No substantial adverse effects on a minority and low-income population would occur. Due to the distance of the solar facility from the Moapa River Indian Reservation, no ecological, health, or cultural impacts are anticipated, as described for construction.

Decommissioning

Socioeconomics. The workforce and length of time for decommissioning is expected to be similar to that of the construction period. Although it is difficult to forecast employment conditions 30 or more years into the future, according to growth projections, it is expected that the available labor pool would be greater than under existing conditions. Decommissioning is expected to temporarily decrease unemployment in the Project area, similar to construction. The effects on regional employment as a result of decommissioning the Proposed Action would be beneficial. Economic output would be beneficial during decommissioning, although after decommissioning, the 19 jobs associated with O&M would be lost. No impacts on housing or public services would occur.

Environmental Justice. The workforce and length of time for decommissioning is expected to be similar to that of the construction period. The only minority and low-income population in the Project area is on the Moapa River Indian Reservation. The temporary need for workers could provide Native Americans on

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the Moapa River Indian Reservation with jobs during this time period. Decommissioning would not disproportionately affect or displace a minority or low-income population, as worker influx is anticipated to be into Las Vegas and not onto the Reservation. Decommissioning activities would not cause any disproportionate ecological, cultural, human health, economic, or social impacts on the Moapa River Indian Reservation population.

Residual Effects

No residual socioeconomic or environmental justice effects from construction, O&M, and decommissioning/reclamation of the Proposed Action would occur.

Cumulative Effects

Socioeconomics. Many of the cumulative projects in Clark County could be constructed simultaneously (#1, #7, #8 through #17, #19 through #22 from Table 3.0-2), requiring a large construction workforce. A small workforce would be needed to operate some of the cumulative projects, primarily the energy projects. The demand for several thousand construction workers would be met primarily by individuals employed in construction in Clark County. Permanent positions would likely be filled by individuals already living in Clark County. Some in-migration from adjacent counties could occur. An adequate quantity of rental housing and temporary lodging is available in Clark County to accommodate workers that temporarily migrate into the county. Construction of the cumulative projects would positively affect the economy by providing jobs and from workers spending money locally. A cumulative substantial demand for public services would not occur as most workers would be sourced from Clark County. The cumulative effect on socioeconomics would not be substantial.

Environmental Justice. A few cumulative projects would be constructed adjacent to or within the boundary of a community with a minority and/or low-income population. A cumulative substantial, adverse effect on a minority and/or low-income population could occur. The Proposed Action would involve construction activities in the vicinity of a minority and low-income population on the Moapa River Indian Reservation. The Proposed Action would not disproportionately affect this population, but rather could provide beneficial effects. The Project would not contribute to a potentially substantial cumulative effect.

All Mowing Alternative

The All Mowing Alternative would result in the development of approximately the same size Project. Areas to be mowed, however, would either require 40 percent more time to construct,²⁷ or would require more workers to complete the work on the same schedule as the Proposed Action.²⁸ The employment and economics benefits during construction of the All Mowing Alternative would create more employment opportunities and more economic output than the Proposed Action. While more housing could be required

²⁷ Increases in schedule for the overall Project would be as follows:

All Mowing Alternative: A 40 percent time increase applied to 98 percent of the Project results in an overall 39 percent increase in schedule.

Hybrid Alternative: A 40 percent time increase applied to 65 percent of the Project results in an overall 26 percent increase in schedule.

²⁸ Factors that contribute to the increased labor to construct mowed areas include the need for vehicles to travel greater distances to access parts of the site, use of special equipment that much reach over longer distances to construct facilities that require more time to set up and operate, construction of deeper posts that take longer to install, and the need to potentially perform more work by hand due to reduced accessibility of large equipment that can perform work more quickly.

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for additional workers, the amount would be far below the approximately 36,000 vacant number of housing unit. No effects on housing or public services would occur. Economic effects on the Moapa Band of Paiutes would also increase proportionally to the increased length of construction, with more employment opportunities for the tribe as well as income from sales at the Moapa Paiute Travel Plaza. No increased environmental impacts would occur that could disproportionately affect the Moapa Band of Paiutes. No residual socioeconomic or environmental justice effects from construction, O&M, and decommissioning of the All Mowing Alternative would occur. The All Mowing Alternatives could require additional workers to maintain vegetation, but that labor would be offset by the reduced labor needs for weed control under the Proposed Action. The All Mowing Alternative would not cause a disproportionate ecological, cultural, human health, economic, or social impact on the Moapa River Indian Reservation population, similar to the Proposed Action.

No residual socioeconomic or environmental justice effects would occur, same as the Proposed Action.

Cumulative impacts would be similar to those described for the Proposed Action. The All Mowing Alternative would not contribute to a potentially substantial effect on the minority and low-income population on the Moapa River Indian Reservation.

Hybrid Alternative

The Hybrid Alternative would result in the development of approximately the same size Project. The Hybrid Alternative would have the same employment and economics benefits during construction as the All Mowing Alternative. The amount of house needed would be similar to the All Mowing Alternative, and no effects on housing or public services would occur. Economic and environmental effects on the Moapa Band of Paiutes would be similar to the All Mowing Alternative. No residual socioeconomic or environmental justice effects from construction, O&M, and decommissioning of the alternatives would occur. The Hybrid Alternative would not cause a disproportionate ecological, cultural, human health, economic, or social impact on the Moapa River Indian Reservation population, similar to the Proposed Action.

No residual socioeconomic or environmental justice effects would occur, same as the Proposed Action.

Cumulative impacts would be similar to those described for the Proposed Action. The Hybrid Alternative would not contribute to a potentially substantial effect on the minority and low-income population on the Moapa River Indian Reservation.

No Action Alternative

The Project would not be constructed under the No Action Alternative. No socioeconomic or environmental justice effects would occur.

3.16 Transportation

3.16.1 Affected Environment

Introduction

This section is based on information provided in the *Transportation and Traffic Technical Report* (EPD Solutions, Inc. 2019). Regulations that apply to the Project are included in Appendix E.

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3.16 Transportation

Analysis Area

Due to the remoteness of the Project site, material and personnel would travel from surrounding communities within Clark County—primarily Las Vegas. Project-related traffic would use I-15 and/or United States Route 93 for regional travel, and North Las Vegas Boulevard and Valley of Fire Road for primary access to the Project. Access is shown in Figure 3.15-1. The analysis area for transportation and traffic includes all of the routes shown in Figure 3.15-1.

Baseline Description

Regional and Local Roadway Facilities

Multiple regional and local roadway facilities are in the Project area, as shown in Figure 3.15-1. The most substantial transportation corridor in the area is I-15, which is located approximately 0.3-mile (0.5-kilometer) northwest of the Project site. The Union Pacific railroad runs generally parallel to I-15 on the west side of the highway and south of Crystal Substation. Valley of Fire Road is a fee access road at the Valley of Fire State Park boundary. Northshore Road is also a fee access road at the Lake Mead National Recreation Area boundary. Vehicles using these roadways are required to stop at the fee collection station. Several unpaved roadways traverse the Project area, including BSBCB, a four-wheel drive track that extends past the Muddy Mountains Wilderness Area to the south. Other unpaved roads within and immediately surrounding the Project site are used by recreational motorists.

Existing Traffic Volumes and Levels of Service

Level of service (LOS) is defined as a qualitative measure describing operational conditions within a traffic stream, in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. LOS indicators for the highway and roadway system are based on specific characteristics of traffic flow on designated sections of roadway during a typical day. For mainline freeway and roadway segments, these indicators include overall traffic volume, speed, and density. A volume-to-capacity ratio is calculated, which is then converted to a letter grade identifying operating conditions and expressed as LOS A (best operating conditions characterized by free-flow traffic, low volumes, and little or no restrictions on maneuverability) through F (worst operating conditions characterized by forced traffic flow with high traffic densities, slow travel speeds, and often stop-and-go conditions) (Transportation Research Board 2016). Existing traffic on both Valley of Fire Road and I-15 in the Project area operate with a traffic volume that is less than each respective road's capacity, that is, they operate at a LOS better than C.

Public Transportation

Rail. Union Pacific Railroad serves the Project region. The main line passes through Las Vegas on its way from Los Angeles to Salt Lake City. The railroad runs west of, and parallel to, I-15 near the Project site. The nearest station stop is in Las Vegas, and the next stop is in Moapa Town, approximately 15 miles (24 kilometers) northeast of the Project site.

Airports. Nearby airports are shown in Figure 3.1-4. Nellis AFB is the nearest airport, approximately 17 miles (27 kilometers) southwest of the Project site and available only to military aircraft. The nearest public airport is North Las Vegas Airport, located approximately 28 miles (45 kilometers) southwest of the Project site, and it does not have scheduled commercial passenger service. South of Las Vegas, approximately 30 miles (48 kilometers) southwest of the Project site, McCarran International Airport is a major commercial hub airport.

3.16.2 Environmental Consequences

Introduction

The Project would add traffic to I-15 and Valley of Fire Road but could also affect nearby regional routes such as US 93, Northshore Road, and SR 169. Traffic volumes in the region are relatively low. Roadway facilities were evaluated according to their theoretical capacity, as outlined in the *Highway Capacity Manual, 6th Edition*. The Project site is in a rural area and typical commute-period peaking is not observed in the area. Supplemental information is provided in the *Transportation and Traffic Technical Report* (EPD Solutions, Inc. 2019). No impact on pedestrian and bicycle access would occur because pedestrian and bicycle facilities are nominal in the region and are not found at the Project site.

Proposed Action

Construction

Roadway Operations. The Proposed Action consists of five development areas, A through E, which would be constructed in phases. Construction activities would occur on each development area; however, the same construction activity may not be occurring across all five development areas at the same time. A preliminary construction schedule identifying overlapping construction activities is provided in the POD. The preliminary construction schedule and equipment needed for each construction activity was analyzed to reveal the time period when the maximum number of trips could occur (i.e., the peak construction period). Several construction activities could occur simultaneously in development areas A, B, C, and D. These activities would include module installation, inverter and switchgear installation, as well as construction of the substations and gen-tie lines. The vehicle trips associated with the peak construction period are analyzed in this section as the “worst-case” scenario.

Heavy construction equipment would be moved on site at the beginning of construction and would remain throughout construction, as needed. These trips are accounted for as part of the delivery truck trips. Daily vehicle traffic would be primarily composed of workers’ passenger cars/light trucks, worker shuttles, delivery trucks, dump trucks, water trucks, waste hauling trucks, concrete trucks, and portable toilet trucks. The highest number of trips would be from construction workers traveling to and from the site each day. The Project includes an option to truck construction water to the Project site, which would increase the number of one-way trips by 96 per day, assuming the use of 4,000-gallon water trucks.

The number of construction workers on site at any time would vary between 500 and 700, with a peak workforce of 900. Most workers would commute from the Las Vegas area, a one-way trip of approximately 33 miles (53 kilometers). Most construction and delivery trucks would arrive and depart the site throughout the day. For the trip generation, this analysis assumed that approximately 20 percent of construction vehicle trips would arrive at or depart from the site during the peak hours of traffic in the Project area. Peak hours of traffic in the Project area start at approximately 9:30 a.m. and 3:00 p.m. and last approximately 1 hour each period.

The peak construction trip generation was calculated to reflect the worst-case scenario, which would occur for a few weeks. A passenger car equivalent (PCE) factor of 2.0 is applied to truck trips to account for the fact that trucks use more capacity on the roadway than a passenger car due to larger size and slower acceleration. Most trips would access the Project site via I-15 and Valley of Fire Road. The travel route was evaluated to determine whether the addition of construction traffic trips would cause either roadway to approach or exceed its capacity.

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During the peak construction period, the analysis area roadways and highways would continue to operate acceptably, with a volume lower than the LOS C capacity, as shown in Table 3.16-1. Effects on roadway operations would not be adverse.

Traffic Hazards. The Project would generate a significant number of workers, delivery, and construction vehicle trips throughout construction. Construction traffic, such as large delivery trucks traveling at low speeds or with extra wide loads, could cause a substantial hazard to other roadway users, particularly along Valley of Fire Road. A Traffic and Transportation Plan is required. MM TRA-1 requires the Traffic and Transportation Plan to specify traffic control measures, such as flaggers, escort vehicles, and signage to minimize conflicts and hazards. Implementation of MM TRA-1 would minimize effects of traffic hazards associated with construction.

Table 3.16-1 Peak Hour and Daily Roadway Operation with Peak Construction Trips (For the Water Trucking Option)

Roadway	Location	Existing Volume	Peak Construction Volume	Existing plus Construction Volume	Hourly/Daily	LOS C Capacity	Volume Less Than Capacity?
I-15	3.2 miles (5 kilometers) north of US 93	25,600	2,910	28,510	Daily	48,100	Yes
I-15	1.5 miles (2.4 kilometers) north of SR 604	30,000	2,910	32,910	Daily	48,100	Yes
Valley of Fire Road	4.8 miles (7.7 kilometers) south of I-15	570	2,910	3,480	Daily	5,100	Yes
I-15 NB Off-Ramp	Valley of Fire Road	123	226	349	Hourly	1,440	Yes
I-15 NB On-Ramp	Valley of Fire Road	85	226	311	Hourly	1,440	Yes
I-15 SB Off-Ramp	Valley of Fire Road	71	226	297	Hourly	1,440	Yes
I-15 SB On-Ramp	Valley of Fire Road	152	226	378	Hourly	1,440	Yes

Installation of the gen-tie lines could require short-term closures of I-15. Temporary closures of I-15 would be coordinated with the NDOT. The necessary encroachment permits and authorizations would be obtained prior to any work within the I-15 ROW. Adverse effects would not occur with proper coordination and implementation of the requirements of the encroachment permits. The Project could also result in damage to public roadways, such as Valley of Fire Road, that could cause a hazard to other roadway users. I-15 is a high-volume roadway designed to accommodate large trucks. As such, no damage is anticipated to occur. Damage to lower volume roadways is most likely to occur at the entrance and exit location to the Project site from Valley of Fire Road but could occur elsewhere along the construction traffic route. MM TRA-2 requires pre- and post-construction road condition assessments and restoration of roadways damaged during and after Project construction. Adverse effects would be minimized by requiring assessment and repair of any public roads during or after construction, in accordance with mitigation.

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3.16 Transportation

Emergency Services. Emergency vehicles currently using roadway facilities in the Project area include ambulance, sheriff, State Highway Patrol, and fire departments. As noted in the analysis of construction traffic, the Project construction would not result in any unsatisfactory level of service with MM TRA-1 (i.e., worse than LOS C); therefore, emergency services would not be hindered due to traffic congestion. Emergency services would not be interrupted by construction of the Project, and access for emergency service to the Project site would always be provided. Adverse effects on emergency services would not occur during project construction.

Operation and Maintenance

Workers would live off site but would commute to the Project site daily to conduct security, maintenance, and repairs. The solar facility would undergo quarterly maintenance inspections for the first year and thereafter annually. O&M of the Project site would require vehicles and equipment such as crane trucks, forklifts, manlifts, and pick-up trucks. No heavy equipment would be used during normal facility operation. Up to 19 employees are expected to be on site each day, which could result in an additional 38 trips per day during operation of the Project. Five additional one-way truck trips would occur daily if water is trucked to the Project site instead of sourced from an on-site well or the Moapa Paiute Travel Plaza. Operation of the Project would generate substantially fewer trips than construction. Effects on traffic operations or emergency services would be even less than during construction.

Decommissioning

The workforce and length of time for decommissioning the Project is expected to be similar to or less than that of the construction period. Effects on regional and local roadway operations would be similar to those analyzed to occur during construction. MM TRA-1 requires incorporation of specific information and measures into the Traffic and Transportation Plan. Implementation of mitigation would minimize the effects.

Residual Effects

Implementation of the mitigation measures would reduce potential adverse effects from construction, O&M, and decommissioning caused by Project-related truck and vehicle trips. Implementation of the mitigation measures would not be expected to result in any other effects. No residual traffic and transportation effects during construction, O&M, and decommissioning of the Proposed Action would occur.

Cumulative Effects

Many of the nearby cumulative projects could feasibly be constructed simultaneously, but not all projects would contribute vehicle trips to the same roadways as the Proposed Action. Construction is complete for many of these projects or they would not contribute trips on the analysis area roadways due to their location. Seven of the cumulative projects (#1, #7, #8, #9, #12, #19, and #21 from Table 3.0-2) are planned to be under construction at the same time as the Project and would contribute trips to I-15 within the analysis area. To identify the construction trips that would be generated by the cumulative projects, the environmental assessment for each project was reviewed to determine the daily worker and truck trips. The estimated construction trips generated by cumulative projects are shown in Table 3.16-2. Access to the cumulative project sites would be from US 93 and I-15. Construction vehicles and trucks would primarily travel to and from the Las Vegas area. Cumulative daily trips were distributed along roadways dependent upon the location of the cumulative project. Only two analysis area roadway segments would be used by cumulative project vehicles. Traffic volumes on the remaining analysis area roadways would remain the same as under existing conditions. As demonstrated in Table 3.16-3, the I-15 roadway

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3.16 Transportation

segments would operate with acceptable LOS with the cumulative plus Project daily vehicle trips. The cumulative impact would not be substantial.

All Mowing Alternative

The All Mowing Alternative would result in development of approximately the same size Project. Areas to be mowed would either require 40 percent more time to construct²⁹ or would require more workers to complete the work on the same schedule as the Proposed Action. The number of workers during the peak construction period as well as deliveries, however, would be the same as with the Proposed Action. Similar impacts would occur under the All Mowing Alternative as under the Proposed Action, but the impacts may last longer with the larger the area to be mowed and, therefore, would result in a longer-lasting impact. The same mitigation for the Proposed Action would apply to this alternative.

Rather than extending the schedule, the Applicant may instead increase the number of workers on site to complete the work in the same amount of time as with the Proposed Action. Under this scenario, the maximum number of workers that could be at the site would remain at 900 based on space/parking and other logistical constraints. The average number of workers could increase from 500 to 700 up to 900 in order to complete the Project on a similar schedule as under the Proposed Action. With a peak number of 900 workers per day, impacts would be the same as with the Proposed Action. With the All Mowing Alternative, the peak construction period impacts would occur for a longer duration than with the Proposed Action because the period when around 900 workers would be on the site would be longer. The same mitigation for the Proposed Action would apply to the All Mowing Alternative to minimize adverse effects.

No residual traffic and transportation effects during construction, O&M, and decommissioning of the All Mowing Alternative would occur, same as the Proposed Action. Cumulative impacts would be similar to those described for the Proposed Action. Since the peak construction period would be longer under the All Mowing Alternative, some degree of greater cumulative impact could occur, but it is not expected to be adverse with mitigation.

Hybrid Alternative

The Hybrid Alternative would result in development of approximately the same size Project as the Proposed Action and the All Mowing Alternative. The Hybrid Alternative would result in similar impacts as the All Mowing Alternative, and the same mitigation as described for the Proposed Action would apply to this alternative to minimize adverse effects.

No residual traffic and transportation effects during construction, O&M, and decommissioning of the All Mowing Alternative would occur, same as the Proposed Action.

Cumulative impacts would be similar to those described for the All Mowing Alternative and are not expected to be adverse with mitigation.

²⁹ Increases in schedule for the overall Project would be as follows:

All Mowing Alternative: A 40 percent time increase applied to 98 percent of the Project results in an overall 39 percent increase in schedule.

Hybrid Alternative: A 40 percent time increase applied to 65 percent of the Project results in an overall 26 percent increase in schedule.

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Table 3.16-2 Cumulative Projects Construction Trip Generation

Cumulative Project	Daily Trips	Daily Trips (PCE)
Harry Allen Solar Energy Center Project (#1)	550	650
Moapa Solar Energy Center (#7)	700	800
Dry Lake Solar Energy Center Project (#8)	500	600
Dry Lake Solar Energy Center at Harry Allen (#9)	500	600
Eagle Shadow Mountain Project (#12) ¹	1,050	1,200
Harry Allen to Eldorado 500kV Transmission Line Project (#19) ²	250	375
TransWest Express Transmission Project (#21)	250	375 ³
Total	3,800	4,600

Notes:

- ¹. Calculated using a ratio of the workers to size of Moapa Solar Energy Center.
- ². Assumes a similar number of trips as the TransWest Express Transmission Project.
- ³. Assumes that half of the trips are truck trips.

Source: (BIA 2013, BLM 2013, BLM 2014b, BLM 2015a)

Table 3.16-3 Cumulative and Cumulative plus Peak Construction Trips

Roadway	Location	Cumulative Daily Trips	Cumulative Plus Project Daily Trips	Cumulative Volume	Hourly/Daily	LOS C Capacity	Volume Less Than Capacity?
I-15	3.2 miles (5.1 kilometers) north of US 93	3,950	6,476	32,076	Daily	48,100	Yes
I-15	1.5 miles (2.4 kilometers) north of SR 604	4,600	7,126	37,126	Daily	48,100	Yes

No Action Alternative

The Project would not be built under the No Action Alternative. No change to the roadway network would occur. As such, no adverse effects would occur.

Mitigation Measures

- MM TRA-1: Traffic and Transportation Plan Measures (from Section 3.16: Transportation)
- MM TRA-2: Road Condition Assessment (from Section 3.16: Transportation)

3.17 Public Health and Safety

3.17.1 Affected Environment

Introduction

This chapter describes the regulations and baseline information related to several health-and-safety-related parameters, including occupational health and safety, electric and magnetic fields, hazardous wastes and materials, emergency response, intentionally destructive acts, and fire risks. Supplemental information is provided in the *Public Health and Safety Technical Report for the Gemini Solar Project* (Panorama Environmental, Inc. 2019g). Several laws and regulations apply to the Project and are described in Appendix E to this EIS.

Data Source

Potential effects with respect to public health and safety are assessed based on existing publications and data compiled by state and federal agencies and reports prepared for the Proposed Action. The following documents and data were reviewed: *Phase I Environmental Site Assessment for Gemini Solar* (HERServices 2018), Final PEIS for Solar Energy Development in Six Southwestern States (DOE and BLM 2012), BLM Fire Management Plan (BLM 2019), Nevada Natural Resources and Fire Information Portal (Nevada Division of Forestry n.d.), Southern Nevada Health District data (SNHD 2017, SNHD 2018), and National Safety Council injury data (National Safety Council 2017).

Analysis Area

The analysis area for public health and safety considerations is all of the development areas for the Project and alternatives and all proposed gen-tie lines. The analysis area for the hazardous waste and materials analysis is limited to areas within 1 mile (1.6 kilometers) of the Project site, as spills would be localized and would not spread far from the Project site. The area of analysis for emergency response includes the ROW, Valley of Fire Road, and I-15.

Baseline Description

Occupational Health and Safety

Most of the occupational hazards associated with solar energy projects are similar to those of the heavy construction and electric power industries. They include physical hazards such as risk of injury from equipment handling, exposure to weather extremes, risks associated with working at extreme heights, and fire and electrical-related risks such as electric shock and burns; biological hazards such as harmful interactions with plants and animals; and chemical hazards such as exposures to hazardous substances used at or emitted from the facilities. At solar and electric transmission facilities, induced current and electric arcing pose a potential occupational hazard.

Electric and Magnetic Fields

Sources of electric and magnetic fields (EMF) include aboveground and underground power lines. The Project region includes numerous high-voltage lines in established energy corridors. Numerous years of studies on the health effects from EMF have generated various conclusions on the scientific evidence of EMF exposures posing a health risk.

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Existing Environmental Site Conditions

The *Phase I Environmental Site Assessment* prepared for the Project did not identify any historic listed hazardous sites that might contribute to site contamination or recognized environmental conditions within a 1-mile (1.6-kilometer) radius around the Project site. Numerous discarded solid waste debris and identifiable trash items were found at the Project site (HERServices 2018).

Solid Waste

Collection and disposal of solid waste in Clark County is managed by the Southern Nevada Health District Solid Waste Management Authority (SWMA). The nearest operational landfill to the Project site is the Apex Landfill, a Class I³⁰ landfill with an estimated closure date of 2082. Several Class III³¹ landfills are located in Clark County and nearby counties, with projected closure years between 2023 and 2070 (NDEP 2017).

Emergency Response

The Las Vegas area has designated the following major evacuation routes: I-15 North to Mesquite, Nevada; United States Route 95 (US 95) North to Reno, Nevada; I-15 South to Southern California; US 95 South to Laughlin, Nevada; and US 93 East to Kingman, Arizona. With the current population of the Las Vegas area and the high numbers of visitors in the Las Vegas area on a daily basis, the capacity of I-15 would be exceeded in the event of a large-scale, mass evacuation (Federal Highway Administration 2017). Valley of Fire Road could be used for emergency access to incidents in the back country.

Public Health

Clark County has a higher mortality rate due to respiratory and heart disease than the United States average, but similar cancer mortality rates (SNHD 2017). In 2017, less than five cases of mosquito-borne West Nile virus and less than five cases of Zika virus were reported in Clark County.

Coccidioidomycosis, commonly known as valley fever, is primarily a disease of the lungs that is common in the southwestern United States and northwestern Mexico. There were 142 cases of valley fever in Clark County in 2017, up from 75 in 2016 (SNHD 2018).

Fire Risks

The majority of the Project site is within an area of low wildfire threat,³² as determined by the Nevada Division of Forestry, with a small portion of the site within an area of low-moderate wildfire threat. Between 1980 and 2016, there were three BLM-recorded wildfire occurrences within the Project site (DOI 2017).

³⁰ Defined as municipal solid waste landfill (Nevada Administrative Code [NAC] 444.5705).

³¹ Defined as a disposal site that accepts only industrial solid waste, including from generation of electric power and construction (NAC 444.585).

³² Wildfire threat is a parameter that is closely related to the likelihood of an acre burning, and is displayed in the Nevada Wildfire Risk Assessment by the Fire Threat Index. The Fire Threat Index is derived from historical fire occurrence; landscape characteristics, including surface fuels and canopy fuels; percentile weather derived from historical weather observations; and terrain conditions.

3.17.2 Environmental Consequences

Proposed Action

Occupational Health and Safety

Construction. Occupational hazards that workers could experience during construction include heat stress or stroke, exposure to hazardous materials, electric shock, and accidents or injuries from use of heavy equipment. Occupational hazards during construction of the Proposed Action would be minimized with implementation of safety standards and the use of appropriate personal protective equipment, as required by law. Employees would be trained on monitoring, proper notification, and containment following a hazardous material release, as detailed in the SPCC Plan, required by law. Adverse effects on workers could still occur. A Health and Safety Plan would be required. MM Public Services (PS)-1 requires the Health and Safety Plan to address training of personnel on all appropriate OSHA and Nevada-OSHA guidelines. MM PS-4 requires implementation of various spill prevention and control measures, in addition to the SPCC Plan. Adverse effects from construction-related occupational hazards would be minimized through the implementation of mitigation and the plans.

Operation and Maintenance. Occupational hazards during O&M are similar to those identified for construction, although fewer workers would be involved in O&M than with construction. Potential health and safety hazards include exposure to hazardous materials and electric shock. Implementation of MM PS-1, MM PS-4, and an SPCC plan, and compliance with OSHA and Nevada-OSHA regulations, would minimize potential occupational hazards during O&M, and impacts are expected to be minimal.

Decommissioning. Decommissioning activities would be similar to construction activities and would also require implementation of MM PS-1, MM PS-4, and compliance with OSHA and Nevada-OSHA guidelines. Implementation of the Health and Safety Plan, health and safety training, and the SPCC Plan would minimize potential adverse health and safety impacts on Project personnel.

Electric and Magnetic Fields

The proposed transmission lines would traverse an uninhabited area, with the closest residences approximately 13 miles (21 kilometers) north of the Project site. No residences or other uses would be subject to EMF exposure from the proposed transmission interconnection line. Adverse effects on humans from EMF exposure are not anticipated.

Environmental Site Contamination

The *Phase I Environmental Site Assessment* did not identify any known spills or uncontrolled releases of hazardous materials or wastes, or other issues associated with chemicals. Recognized environmental conditions could be present on the Project site, but no evidence of any release of chemicals into the environment associated with recognized environmental conditions was found. Five oil and gas wells were recorded within the Project area, which may have left residual contamination. The existing wastes on site present some hazards to human health and safety and could result in potentially adverse effects. MM PS-2 requires verification of well locations and avoidance during construction. Implementation of MM PS-1 and MM PS-2 would minimize the potential exposure of workers to existing unknown hazardous materials. Impacts associated with site contamination are considered unlikely and would be handled per mitigation to minimize adverse effects.

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Risk of Hazardous Materials Accidents or Spills

Construction. Construction of the Project would involve the use, storage, and disposal of hazardous materials. The quantities and concentrations of these hazardous substances are not expected to reach regulated levels. Routine transportation of hazardous materials to and from the site could create a hazard to the public or the environment if materials were improperly handled or were accidentally released. All use, storage, transport, and disposal of hazardous materials would be in strict accordance with all regulations and guidelines. An SPCC Plan would be developed prior to construction in accordance with regulations. The plan would include a facility diagram that would identify the location and contents of hazardous materials containers; potential equipment failures; containment and diversionary structures; facility drainage; personnel, training, and spill prevention procedures; and emergency contact information. A SWPPP would also be prepared, which would establish procedures to minimize the effect of accidental releases on water quality. Implementation of MM PS-1, MM PS-4, and compliance with regulations would minimize the risk of hazards associated with accidents and spills. Although these hazards could still occur, the likelihood of occurrence is considered low. Effects would be short-term and localized if a release were to occur because of the small quantities of hazardous materials that would be used, the very limited rainfall, and the flat topography.

Operation and Maintenance. O&M would require the routine transport, use, and disposal of hazardous materials and wastes, including materials used for maintenance or damaged equipment such as solar panels. Limited use of pesticides would occur to control non-native and noxious weeds. Accidental release of pesticides, hazardous materials, or waste could affect public health or the environment. The batteries used for the solar facility would most likely be lithium-ion, which are not considered hazardous waste, but must be handled and recycled properly to prevent combustion and fire hazards. Numerous regulations ensure the safe transport, use, storage, and disposal of hazardous materials. Hazardous materials accidents or spills could still occur. Requirements of the SPCC Plan would be implemented for transformers and other oil-containing structures. The BLM requires preparation and approval of a PUP before pesticides can be used. The PUP would identify the types of pesticides that could be used and application protocols. MM PS-1 and MM PS-4 would ensure that personnel are properly trained in the handling of relevant chemicals and wastes and instructed in the procedures to follow in case of a chemical spill or accidental release. Implementation of mitigation would minimize adverse effects associated with hazardous materials upset. Effects would be short-term and localized if a release were to occur.

Decommissioning. Decommissioning would require the use of fuel and lubricants for vehicles and equipment, as well as the transport and disposal of hazardous materials used at the Project facility, such as refrigerants, spent solar panels, and electrical equipment. Inadvertent release of hazardous materials could occur. Compliance with existing laws and regulations would ensure that the risk of hazards associated with accidents and spills or leaks during decommissioning would be minimized. Although these hazards could still occur, the likelihood of an incident is considered low. Adverse impacts associated with any accidental release of hazardous materials would be minor and localized.

Solid Waste Management

Construction. Construction of the Project would generate solid waste. All handling and processing of construction debris, including hazardous and non-hazardous materials, would be in accordance with applicable regulatory requirements as described in the POD. Construction would result in the disposal of approximately 9,000 cubic yards (6,881 cubic meters) of scrap metal, wood, and other debris (USEPA 2016). Other materials, such as batteries and used oil, would be disposed of throughout construction. The

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solid waste generated during construction would not exceed the capacity of local landfills, including Apex Landfill, and there would be no adverse effect related to solid waste management.

Operation and Maintenance. The Proposed Action would produce wastes typically associated with O&M activities. These wastes would include defective or broken electrical materials (e.g., panel parts, batteries), empty containers, the typical refuse generated by workers and small office operations, and other miscellaneous solid wastes. The solid waste generated during O&M would not exceed the capacity of the local landfills and there would be no adverse effect. Batteries would be handled and recycled in accordance with manufacture recommendations to avoid fire hazards. To ensure that wastes would be disposed of in accordance with laws, MM PS-1 requires preparation and implementation of a Waste and Hazardous Materials Management Plan prior to operation to minimize potential effects.

Decommissioning. Decommissioning would result in the generation of solid waste such as concrete, metal, plastics, and photovoltaic panels. Recyclable materials would be removed from the waste stream and recycled. Solar panels and used batteries would be returned to the vendor for appropriate recycling. Based on current estimates and permits, several landfills in the area are expected to be open at the time of decommissioning (in 30 years) and would have remaining capacity available at the time of decommissioning. No adverse effect would occur.

Emergency Response

Construction. Project construction would occur primarily in undeveloped areas, accessed by I-15 (a designated major evacuation route) and Valley of Fire Road. Installation of the gen-tie lines could require a short-term closure of I-15. Temporary closures of I-15 would be coordinated with the NDOT. The necessary encroachment permits and authorizations would be obtained prior to any work within the I-15 ROW. There would be no adverse effects on emergency response with proper coordination and implementation of the requirements of the encroachment permits.

Evacuation of a large number of construction workers and Project personnel from the Project area could be required during an emergency. An Emergency Action Plan would be prepared to address evacuation, in accordance with OSHA (29 CFR 1910.38[a]) and MM PS-1. Construction of the Proposed Action would not result in any adverse impacts on emergency response activities.

Operation and Maintenance. O&M of the Proposed Action would neither cause road closures nor impair access to local roads. Internal access roads in the solar facility would be designed to meet the Clark County Fire Code. O&M of the Project would not result in any adverse impacts on emergency response activities during construction. Risk to on-site workers would be minimized with implementation of an Emergency Action Plan, in accordance with OSHA and MM PS-1. Effects on workers from an emergency during O&M would not be substantial.

Decommissioning. Decommissioning activities would be similar to construction activities and would not impair implementation of or physically interfere with an adopted Emergency Action Plan.

Public Health

Occurrences of West Nile virus and Zika in Clark County are very low; therefore, the risk to public health from these vector-borne diseases is extremely low. The Project would require the development of four 1-acre (0.4-hectare) water storage ponds during construction, which could increase the risk of mosquito breeding and consequently the risk of West Nile virus and Zika. Implementation of the SWPPP, which requires stormwater and erosion control, would reduce the potential for unintentional ponding of water on

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or downstream of the Project site. The stormwater control measures reduce the risk of mosquitos breeding on or near the Project site. If mosquitos were to become an issue at water storage ponds, the ponds could be covered or treated to reduce the pests. A PUP would be prepared and approved by the BLM prior to application of pesticides to reduce mosquitos. The Proposed Action would not increase risks or bring West Nile virus and Zika to the area. The occurrences of valley fever in Clark County are also low. Fugitive dust generated during construction and decommissioning could expose workers to *Coccidioides* fungal spores that may be present in desert soils. MM AQ-1 requires the development and implementation of a Dust Control and Air Quality Plan, which would reduce fugitive dust and minimize the risk to workers of contracting valley fever.

Intentionally Destructive Acts

Construction. The risk to workers or the public from intentionally destructive acts during construction would be low, as public access to the proposed construction and staging areas would be controlled by security and fencing.

Operation and Maintenance. The consequences of a release of hazardous materials used at the solar facility would not cause a threat to the health and safety of the surrounding community due to the limited quantity and toxicity of the substances and the distance to the nearest receptors. The Project includes security measures in accordance with BLM recommendations, such as fencing and controlled gate access, lighting, security patrols, and electronic security systems. These features of the Proposed Action would minimize the potential for intentional power disruptions or hazardous materials release. Non-emergency access would be limited to the access gates from Valley of Fire Road. Adverse impacts associated with intentionally destructive acts during O&M of the Proposed Action are unlikely, given the security measures included in the design and the relatively low likelihood of such an action.

Decommissioning. The risk to workers or to the public from intentional acts during decommissioning would be minimal. Decommissioning includes the removal of the facility. Once the facility is taken offline, the likelihood of being a target of intentionally destructive acts is even further reduced with minimal consequences as the Proposed Action would no longer operate and produce power.

Fire Risks

Construction. The probability of a wildfire resulting from Project construction would be low due to the low wildfire threat rating in the Project area. The occurrence of wildfires in the majority of the Project area has historically been low. Direct impacts of wildfire could include damage to the solar facility components, damage to other nearby facilities, spread of wildfire to lands outside the Project area, impacts on air quality and recreational uses, and mortality of plants and wildlife. Indirect impacts would result in changes to the vegetation communities and the wildlife supported by these communities. The spread of invasive plants, especially annual grasses, creates an increased potential for wildfires that could result in significant ecological change. Construction of the Proposed Action could increase the fire hazard risk. MM PS-3 requires preparation and implementation of a Fire Prevention and Safety Plan to minimize adverse effects associated with increased fire hazards during construction.

Operation and Maintenance. The probability of a wildfire occurring as a result of O&M would be low due to the low-risk site conditions and low level of O&M activities, although the spread of invasive species under the Proposed Action would be significant and adverse (see Section 3.7: Vegetation and Jurisdictional Drainages). Compliance with regulations would reduce but not eliminate fire hazard risks from hazardous materials, improper disposal of lithium-ion batteries, and line breakages. Implementation

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of MM PS-3 and the Site Restoration Plan would reduce adverse effects associated with fire hazards during O&M.

Decommissioning. Potential effects from decommissioning would be similar to those described for construction.

Residual Effects

Residual effects on public health and safety related to occupational risk, EMF, hazardous materials, public health, emergency response, and intentionally destructive acts are not anticipated and would be minimal after implementation of regulatory requirements and mitigation. Residual impacts related to wildland fire ecology would only occur in the event of a fire, which is not expected to occur or would be minimal with implementation of mitigation.

Cumulative Effects

Cumulative projects would involve the use, storage, and disposal of hazardous materials. Many cumulative projects are accessible from I-15, along which hazardous materials could be transported. Ground-disturbing activities could disturb contaminated soils or sites. Improper disposal and handling of contaminated materials, or accidental release of hazardous materials during handling or transport, could expose the public to health risk. The cumulative effect could be substantial. The Proposed Action would involve handling of hazardous materials and could disturb unknown contaminated sites. The Project would contribute to a substantial cumulative effect. Preparation of a Health and Safety Plan in accordance with MM PS-1 would minimize the Project's contribution to a potentially substantial effect on public health and safety. Cumulative projects would generate hazardous and non-hazardous waste during construction and operation that would require disposal. Due to the number of landfills in southern Nevada, cumulative projects are not anticipated to substantially affect landfill capacity. The cumulative effect would not be substantial. Construction and operation of the adjacent cumulative projects that involve the use of heavy machinery or off-road vehicle use would increase the risk of starting a wildfire. The cumulative fire hazard risks would be substantial. The Proposed Action would involve activities that could spark a fire or change the fire susceptibility, resulting in a contribution to the cumulative regional fire risk. MM PS-3, which requires preparation and implementation of a Fire Prevention and Safety Plan, would minimize the Project's contribution to a potentially substantial cumulative effect.

All Mowing Alternative

The All Mowing Alternatives would use and transport the same types of hazardous materials as the Proposed Action. No known spills or uncontrolled releases of hazardous materials or wastes, or other issues associated with chemicals are found on the areas All Mowing Alternative area. No residences or other uses would be subject to EMF exposure from the proposed transmission interconnection line. Potential occupational and waste impacts would be similar to the Proposed Action.

The All Mowing Alternative would result in similar fire risk to existing conditions, and potentially decreased fire risk compared to existing conditions due to maintenance of native vegetation and a decreased potential for spread of fire-prone invasive weeds. Vegetation would be mowed to 24 inches but not less than 18 inches. Most vegetation is already under 24 inches in height such that mowing would not affect all plants on the site. Creosote bush would be the primary species to be impacted by mowing. Survival of native vegetation in the solar field (needed to keep weed species in check) is unknown but expected. Impacts would be minimized with implementation of MMs PS-1 through PS-4. Despite slightly

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different geographic extents for each alternative, differences in impacts would not be appreciable. Mitigation would minimize adverse effects.

The All Mowing Alternative would have the same residual effects as the Proposed Action.

Cumulative effects would be the same as described for the Proposed Action. Mitigation would be implemented to minimize the All Mowing Alternative's contribution to a potentially substantial cumulative effect related to wildfire hazard, and public health and safety.

Hybrid Alternative

The Hybrid Alternative would have the same impacts on public health and safety as the All Mowing Alternative for the mowed areas and as the Proposed Action for the traditional development areas. Impacts would be reduced with implementation of MMs PS-1 through PS-4. Mitigation would minimize adverse effects, with the same residual effects as the Proposed Action.

The All Mowing Alternative would have the same residual effects as the Proposed Action.

Cumulative effects would be the same as described for the Proposed Action. Mitigation would be implemented to minimize the All Mowing Alternative's contribution to a potentially substantial cumulative effect related to wildfire hazard, and public health and safety.

No Action Alternative

The Project would not be built under the No Action Alternative. None of the human health and safety impacts described for the Project would occur.

Mitigation Measures

- MM PS-1: Health and Safety Plan (from Section 3.17: Public Health and Safety)
- MM PS-2: Oil and Gas Well Avoidance (from Section 3.17: Public Health and Safety)
- MM PS-3: Fire Prevention and Safety Plan (from Section 3.17: Public Health and Safety)
- MM PS-4: Spill Prevention and Control Measures (from Section 3.17: Public Health and Safety)
- MM AQ-1: Emissions Controls (from Section 3.9: Air Quality and Climate Change)

Chapter 4 Consultations, Coordination, and Public Involvement

4.1 Introduction

This chapter summarizes the consultation and coordination activities conducted with interested agencies, organizations, tribes, and individuals for the Project. The primary goal of the NEPA public involvement process is to ensure that all interested and affected parties are aware of the Project. For the purposes of public involvement, the NEPA process is divided into two phases: the scoping period and the Draft EIS review period. The scoping period includes the initial presentation of the Project to the public and opportunities for the public and agency representatives to provide comments. The Draft EIS review period presents the public with opportunities to comment on the document.

4.2 Public Involvement Process

4.2.1 Scoping

The BLM published a NOI to prepare an EIS for the Project in the Federal Register on July 13, 2018, which initiated a 45-day public scoping period for the Project, ending on August 27, 2018. The BLM hosted two public scoping meetings for the Project, on August 1, 2018 in Las Vegas and August 2, 2018 in Moapa Town. The scoping meetings on August 1 was attended by 22 people and the scoping meeting on August 2 was attended by two people. Attendees included representatives from state agencies, organizations, and individuals. The BLM received 34 emails and letters during the scoping period. A *Scoping Report* was prepared to summarize the comments addressed (Panorama Environmental, Inc. 2018). The BLM also sent letters in September 2017 to invite agencies to become cooperating agencies. The cooperating agencies include BLM, USACE, USEPA, DoD, USFWS, Nevada Department of Wildlife, Nevada Division of Forestry, and Clark County. The NPS is a participating agency.

4.2.2 Draft EIS Review Period

The USEPA's publication of the Notice of Availability (NOA) of the Draft PA/EIS in the Federal Register initiates a 90-day public review and comment period under BLM Land Use Planning regulations (43 CFR 1610.2) and NEPA. Members of the public, agencies, organizations, tribes, and jurisdictions are provided the opportunity to comment on the Draft EIS during the review period.

4.3 Formal Consultation with Tribal Governments

The BLM conducted government-to-government consultations over several months, pursuant to Section 106 of the NHPA, expanding on larger efforts undertaken by BLM to consult on renewable energy projects in southern Nevada. Consultation letters were distributed to the tribes requesting their respective input on the Project. The BLM traveled to and consulted with the following tribes: Moapa Band of Paiutes, Las Vegas Paiute Tribe, Fort Mojave Tribe, Twenty-Nine Palms Band of Mission Indians, Chemehuevi Indian Tribe, Bishop Paiute Tribe, and Timbisha Shoshone Tribe. Most tribes deferred to the Moapa Band of Paiutes for identifying issues and concerns about the Gemini Solar Project. The tribe's concerns have involved BLM coordination with the tribe, including the hiring of a tribal liaison from the Moapa Band of Paiutes. The Twenty-Nine Palm Band of Mission Indians stated that the Gemini Solar Project was located on the edge of their historic use area.

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4.4 EIS Mailing List, Notification, and Distribution

The BLM sent the Draft EIS to nine federal, 13 state, and nine local agencies and to seven tribal governments:

Federal

Advisory Council on Historic Preservation
Bureau of Indian Affairs – Western Regional Office
DoD, Nellis AFB
USEPA
FAA
National Parks Service – Pacific West Region
National Parks Service – National Trails Intermountain Region
USACE – Sacramento District
USFWS – Southern Nevada District Office

State of Nevada

Nevada Department of Public Safety – Nevada State Fire Marshal Division
Nevada Department of Transportation
Nevada Department of Wildlife – Southern Region
Nevada Division of Forestry
Nevada Division of Environmental Protection
Nevada Division of Minerals
Nevada Division of Water Resources
Nevada Governor’s Office
Nevada Governor’s Office of Economic Development
Nevada Governor’s Office of Energy
Nevada State Clearinghouse
Nevada State Historic Preservation Office
Public Utilities Commission of Nevada

Clark County

Board of Commissioners
Comprehensive Planning
Department of Air Quality
Desert Conservation Program
Fire Department
Health District Air Pollution Control Division
Public Works Department
Regional Flood Control District
Department of Aviation

Tribal Government

Moapa Band of Paiutes
Las Vegas Paiute Tribe
Fort Mojave Indian Tribe
Twenty-Nine Palms Band of Mission Indians
Chemehuevi Indian Tribe
Bishop Paiute Tribe
Timbisha Shoshone Tribe

Copies of the Gemini Solar Project Draft EIS are available for public review at the following location:

Bureau of Land Management, Southern Nevada District Office
4701 N. Torrey Pines Drive
Las Vegas, Nevada 89130

4.5 Next Steps in the Planning Process

Upon receipt and consideration of the public comments on the Draft EIS, the BLM will publish the Final EIS. Concurrently, the BLM may publish a ROD and authorize the ROW applications. The ROD would identify the selected alternative for the Project.