U.S. Department of the Interior
Bureau of Land Management

Las Vegas Field Office

Environmental Impact Statement

Final Environmental Impact Statement and Proposed Resource Management Plan Amendment

DOI-BLM-NV-S010-2022-0063-EIS

Rough Hat Clark Solar Project

Mineral and Land Records System (MLRS) Casefile Number: NVNV105839715

Legacy Casefile Number: NVN-099406

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November 1, 2024

Preparation Cost: $727,000

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 ROUGH HAT CLARK SOLAR PROJECT

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

Document Status: Draft ( ) Final (X)

Abstract:

Candela Renewables, LLC applied to the BLM's Las Vegas Field Office for a right-of-way (ROW) grant to provide the necessary land and access for the construction, operation, maintenance, and eventual decommissioning of the proposed Rough Hat Clark Solar Project (Project). The Project would include up to a 400-megawatt (MW) alternating current (AC) solar photovoltaic (PV) power generating facility with up to 700 MW of battery energy storage and associated interconnection to the regional transmission system generation tie-line and access road facilities on approximately 2,469 acres of BLM-managed public land located in the Pahrump Valley in Clark County, Nevada, southeast of the town of Pahrump, and approximately 38 miles west of the city of Las Vegas.

The 1998 *Las Vegas Resource Management Plan* (RMP) classifies the area the Project is located as a Class III Visual Resource Management (VRM) area. The Project would amend the VRM Class III objective for the area 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 Proposed Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement (EIS) with input from cooperating agencies[1] and Indian tribes to address the direct, indirect, and cumulative impacts of the Project. The cooperating agencies include the United States Environmental Protection Agency, United States Fish and Wildlife Service Ecological Services Program, United States Fish and Wildlife Service Migratory Bird Program, Nevada Department of Public Safety, Nevada Department of Wildlife, Nevada Division of Forestry, Clark County Department of Environment and Sustainability, Clark County Department of Aviation, Nye County, and Moapa Band of Paiutes. This RMPA/EIS evaluates the Proposed Action, one alternative to the Proposed Action, and the No Action Alternative. The Proposed Action and the alternative involve development on approximately 1,950 acres of land within the 2,469-acre ROW 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 clear and cut/drive and crush and clear and cut with soil removal (grading) to remove vegetation in the solar array areas. Alternative 1, the Resources Integration Alternative, would involve solar development using overland travel, with clear and cut/drive and crush and clear and cut with soil removal (grading) limited to 20 – 21 percent of the development area. The BLM has identified the Resources Integration Alternative as the preferred alternative. The No Action Alternative would be a continuation of existing conditions. The alternative was developed using input from the public, stakeholders, and participating and cooperating agencies.

[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.

Major environmental and planning issues addressed include impacts on special status plant and animal species, including the federally listed Endangered Mojave desert tortoise.

Review Period: The BLM published the Proposed RMPA/ Final EIS. Publication of the Proposed RMPA/ Final EIS commences a 30-day protest period and 60-day Governor's Consistency Review period regarding the land use planning decisions proposed in the Final RMPA/EIS. Upon resolution of public protests and comments from the Governor, the BLM would then publish the ROD that makes a decision about whether to approve the ROW application. The ROD would identify the selected alternative for the Project.

For further information, please contact:

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In Reply Refer To:
NVN-099406
2800 (NVS0100)

November 1, 2024

Dear Reader:

Enclosed for your review is the Proposed Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement (EIS) for the Rough Hat Clark Solar Project (Project). The Proposed RMPA/ Final EIS was prepared by the U.S. 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 would include the construction, operation, maintenance, and decommissioning of an approximately 400-megawatt solar photovoltaic electric generating facility, up to 700 MW of battery energy storage, and associated transmission interconnection infrastructure and access road facilities on approximately 2,469 acres of federal lands administered by the BLM. Approval of the right-of-way application for the Project 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 utility solar development.

In preparing the Proposed RMPA/ Final 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 cooperating agencies and Indian tribes, (2) issues raised by BLM resource specialists, and (3) applicable planning criteria. This process has resulted in the development of one action alternative in addition to the Proposed Action. The No Action Alternative is also addressed, which constitutes a continuation of existing conditions and current land management in the application area. The alternatives are described in Chapter 2 of the Proposed RMPA/ Final EIS.

The BLM has identified Alternative 1, the Resources Integration Alternative as the preferred alternative. As described in the Proposed RMPA/ Final EIS, this alternative involves using modified construction methods which would reduce vegetation removal and limit soil grading to 20 – 21 percent of the development area. 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.

In making a decision, the BLM may select various components from each of the alternatives analyzed in the Proposed RMPA/ Final EIS to best meet the purpose and need for the Project. The decision maker considers the identified effects, public comments, and information from consulting parties to make a decision that protects environmental resource values while providing for multiple uses.

The Proposed RMPA/ Final EIS is available on the Project website at: https://eplanning.blm.gov/eplanning-ui/project/2019992/510. Hard copies are also available for public review at the following locations:

- BLM Southern Nevada District Office, Pahrump Field Office 4701 N. Torrey Pines Drive, Las Vegas, Nevada 89131
- Pahrump Community Library, 701 East Street, Pahrump, NV 89408
- Tecopa Branch Library, 408 Tecopa Hot Springs Road, P.O. Box 218, Tecopa, CA 92389

Implementation decisions, such as granting or denying a right-of-way, are not subject to protest under BLM planning regulations but are subject to an administrative review process following the issuance of the Record of Decision (ROD). The Proposed RMPA/ Final EIS includes a land use planning action. A person who meets the conditions outlined in 43 CFR 1610.5-2 and wishes to file a protest must do so within 30 calendar days of the date that the United States Environmental Protection Agency publishes its Notice of Availability in the Federal Register. Instructions for filing a protest with the Director of the BLM regarding the Proposed RMPA/ Final EIS may be found online at https://www.blm.gov/filing-a-plan-protest and at 43 CFR 1610.5-2. Before including your address, telephone number, email address, or other personal identifying information in your protest, be advised that your entire protest, 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.

The BLM Director will render a written decision on each protest. The decision will be mailed to the protesting party. The decision of the BLM Director shall be the final decision of the Department of the Interior on each protest. Responses to protest issues will be compiled and formalized in a Director's Protest Resolution Report made available following issuance of the decisions. Upon resolution of all protests, the BLM will issue the ROD. All Project documents will be made available electronically on the BLM National NEPA Register website at: https://eplanning.blm.gov/eplanning-ui/project/2019992/510.

Thank you for your continued interest in the Rough Hat Clark Solar Project.

Sincerely,

BRUCE SILLITOE Digitally signed by BRUCE SILLITOE
Date: 2024.10.22 13:54:08 -07'00'

Bruce Sillitoe
Field Manager
Las Vegas Field Office

Table of Contents

ES-1 Introduction ES-1
ES-1.1 BLM Purpose and Need ES-1
ES-1.2 Decisions to be Made ES-2
ES-2 Consultation and Coordination ES-2
ES-2.1 Public Participation ES-2
ES-2.2 Interagency Consultation and Coordination ES-2
ES-2.3 Tribal Consultation ES-3
ES-3 Issue Identification ES-3
ES-4 Proposed Action And Alternatives ES-5
ES-4.1 Proposed Action ES-7
ES-4.2 Alternative Action ES-8
ES-4.3 No Action Alternative ES-9
ES-5 Comparison Of Effects ES-9
ES-6 Federal Lead Agency Preferred Alternative ES-13
Chapter 1. Introduction and Purpose and Need 1-1
1.1 Introduction 1-1
1.2 Background and Project History 1-1
1.3 BLM Purpose And Need 1-1
1.4 Decisions to be Made 1-2
1.5 Authorizing Laws, Regulations, Permits, And Guidelines 1-2
1.6 Relationship of the Project to BLM Policies, Plans, and Programs, and Land Use Plan Conformance Determination 1-2
1.7 Interagency Coordination 1-6
1.8 Scoping and Issue Identification 1-6
1.9 Resource Management Plan Amendment Planning Criteria 1-11
Chapter 2. Proposed Action and Alternatives 2-1
2.1 Introduction 2-1
2.1.1 Right-of-Way Application, Proposed Action, and Resource Management Plan Amendment 2-1
2.1.2 Development of Alternatives 2-2
2.2 Definitions 2-3
2.2.1 Construction Methods 2-3
2.2.2 Additional Definitions 2-4

2.2.3 Solar PEIS and District Project Design Features 2-4
2.3 Elements Common to all Action Alternatives 2-5
2.3.1 Overview 2-5
2.3.2 Project Components 2-5
2.3.3 Project Construction 2-10
2.3.4 Project Operations and Maintenance 2-13
2.3.5 Project Termination, Decommissioning, and Site Reclamation 2-14
2.4 Proposed Action 2-15
2.5 Alternatives 2-17
2.5.1 Alternative Action 1 – Resources Integration Alternative 2-17
2.5.2 No Action Alternative 2-21
2.5.3 Alternatives Considered but Eliminated from Detailed Study 2-21
2.5.4 Comparison of Alternatives 2-26
2.6 Federal Lead Agency Preferred Alternative 2-30
Chapter 3.Affected Environment and Environmental Impacts 3.1-1
3.1 Introduction 3.1-1
3.1.1 Affected Environment 3.1-1
3.1.2 Environmental Effects 3.1-1
3.1.3 Relevant Required Project Management Plans, Project Design Features, and Project Mitigation Measures Identified in the Analysis 3.1-2
3.1.4 Cumulative Effects 3.1-3
3.2 Geographic Extent, Analysis Area, and Timeframe for Cumulative Effects Analysis 3.2-1
3.3 Air Quality 3.3-1
3.3.1 Introduction 3.3-1
3.3.2 Analysis Area 3.3-1
3.3.3 Affected Environment 3.3-1
3.3.4 Environmental Consequences 3.3-3
3.4 Biological Resources – Wildlife, Migratory Birds, and Other Special Status Wildlife 3.4-1
3.4.1 Introduction 3.4-1
3.4.2 Analysis Area 3.4-1
3.4.3 Affected Environment 3.4-2
3.4.4 Environmental Consequences 3.4-5
3.4.5 Proposed Action 3.4-6
3.4.6 Alternative 1 – Resources Integration Alternative 3.4-17
3.4.7 No Action Alternative 3.4-20

3.4.8 Design Features and Mitigation Measures 3.4-20
3.4.9 Irreversible and Irretrievable Impacts 3.4-22
3.5 Biological Resources – Threatened and Endangered Species 3.5-1
3.5.1 Introduction 3.5-1
3.5.2 Analysis Area 3.5-1
3.5.3 Affected Environment 3.5-1
3.5.4 Environmental Consequences 3.5-5
3.5.5 Proposed Action 3.5-5
3.5.6 Alternative 1 – Resources Integration Alternative 3.5-15
3.5.7 No Action Alternative 3.5-20
3.5.8 Design Features and Mitigation Measures 3.5-20
3.5.9 Irreversible and Irretrievable Impacts 3.5-24
3.6 Climate Change 3.6-1
3.6.1 Introduction 3.6-1
3.6.2 Analysis Area 3.6-1
3.6.3 Affected Environment 3.6-1
3.6.4 Environmental Consequences 3.6-2
3.6.5 Proposed Action 3.6-2
3.6.6 Alternative Action 1 .... 3.6-5
3.6.7 No Action Alternative 3.6-6
3.6.8 Project Design Features and Mitigation Measures 3.6-6
3.6.9 Irreversible or Irretrievable Impacts 3.6-6
3.7 Cultural Resources 3.7-1
3.7.1 Introduction 3.7-1
3.7.2 Analysis Area 3.7-1
3.7.3 Affected Environment 3.7-2
3.7.4 Environmental Consequences 3.7-3
3.7.5 Proposed Action 3.7-4
3.7.6 Alternative 1 – Resources Integration Alternative 3.7-10
3.7.7 No Action Alternative 3.7-10
3.7.8 Project Design Features and Mitigation Measures 3.7-10
3.7.9 Irreversible and Irretrievable Impacts 3.7-10
3.8 Environmental Justice 3.8-1
3.8.1 Introduction 3.8-1
3.8.2 Analysis Area 3.8-1

3.8.3 Affected Environment 3.8-2
3.8.4 Environmental Consequences 3.8-7
3.8.5 Proposed Action 3.8-7
3.8.6 Alternative 1 – Resources Integration Alternative 3.8-13
3.8.7 No Action Alternative 3.8-13
3.8.8 Design Features and Mitigation Measures 3.8-13
3.8.9 Irreversible and Irretrievable Impacts 3.8-14
3.9 Land Use and Realty 3.9-1
3.9.1 Introduction 3.9-1
3.9.2 Analysis Area 3.9-1
3.9.3 Affected Environment 3.9-1
3.9.4 Environmental Consequences 3.9-3
3.9.5 Proposed Action 3.9-3
3.9.6 Alternative 1 – Resources Integration Alternative 3.9-7
3.9.7 No Action Alternative 3.9-8
3.9.8 Design Features and Mitigation Measures 3.9-8
3.9.9 Irreversible and Irretrievable Commitments of Resources 3.9-8
3.10 Native American Concerns 3.10-1
3.10.1 Introduction 3.10-1
3.10.2 Analysis Area 3.10-1
3.10.3 Affected Environment 3.10-1
3.10.4 Environmental Consequences 3.10-3
3.10.5 Proposed Action 3.10-3
3.10.6 Alternative 1 – Resources Integration Alternative 3.10-4
3.10.7 No Action Alternative 3.10-5
3.10.8 Project Design Features and Mitigation Measures 3.10-5
3.10.9 Irreversible and Irretrievable Impacts 3.10-6
3.11 Public Health and Safety 3.11-1
3.11.1 Introduction 3.11-1
3.11.2 Analysis Area 3.11-1
3.11.3 Affected Environment 3.11-1
3.11.4 Environmental Consequences 3.11-2
3.11.5 Proposed Action 3.11-3
3.11.6 Alternative 1 – Resources Integration Alternative 3.11-10
3.11.7 No Action Alternative 3.11-10

3.11.8 Design Features and Mitigation Measures 3.11-10
3.11.9 Irreversible or Irretrievable Impacts 3.11-12
3.12 Recreation 3.12-1
3.12.1 Introduction 3.12-1
3.12.2 Analysis Area 3.12-1
3.12.3 Affected Environment 3.12-1
3.12.4 Environmental Consequences 3.12-5
3.12.5 Proposed Action 3.12-5
3.12.6 Alternative 1 – Resources Integration Alternative 3.12-8
3.12.7 No Action Alternative 3.12-8
3.12.8 Design Features and Mitigation Measures 3.12-8
3.12.9 Irreversible or Irretrievable Impacts 3.12-9
3.13 Socioeconomics 3.13-1
3.13.1 Introduction 3.13-1
3.13.2 Analysis Area 3.13-1
3.13.3 Affected Environment 3.13-1
3.13.4 Environmental Consequences 3.13-5
3.13.5 Proposed Action 3.13-6
3.13.6 Alternative 1 – Resources Integration Alternative 3.13-14
3.13.7 No Action Alternative 3.13-14
3.13.8 Design Features and Mitigation Measures 3.13-15
3.13.9 Irreversible and Irretrievable Impacts 3.13-15
3.14 Soils and Paleontological Resources 3.14-1
3.14.1 Introduction 3.14-1
3.14.2 Analysis Area 3.14-1
3.14.3 Affected Environment 3.14-1
3.14.4 Environmental Consequences 3.14-5
3.14.5 Proposed Action 3.14-6
3.14.6 Alternative 1 – Resource Integration Alternative 3.14-12
3.14.7 No Action Alternative 3.14-13
3.14.8 Project Design Features and Mitigation Measures 3.14-14
3.14.9 Irreversible and Irretrievable Impacts 3.14-15
3.15 Transportation and Traffic 3.15-1
3.15.1 Introduction 3.15-1
3.15.2 Analysis Area 3.15-1

3.15.3 Affected Environment 3.15-1
3.15.4 Environmental Consequences....................3.15-2
3.15.5 Proposed Action 3.15-3
3.15.6 Alternative 1 – Resources Integration Alternative 3.15-9
3.15.7 No Action Alternative 3.15-9
3.15.8 Design Features and Mitigation Measures 3.15-9
3.15.9 Irreversible or Irretrievable Impacts 3.15-10
3.16 Vegetation, Special Status Plants, and Noxious Weeds....................3.16-1
3.16.1 Introduction 3.16-1
3.16.2 Analysis Area 3.16-1
3.16.3 Affected Environment 3.16-1
3.16.4 Environmental Consequences....................3.16-6
3.16.5 Proposed Action 3.16-7
3.16.6 Alternative 1 – Resources Integration Alternative 3.16-19
3.16.7 No Action Alternative 3.16-25
3.16.8 Design Features and Mitigation Measures 3.16-25
3.16.9 Irreversible and Irretrievable Impacts....................3.16-27
3.17 Visual Resources....................3.17-1
3.17.1 Introduction 3.17-1
3.17.2 Analysis Area 3.17-1
3.17.3 Affected Environment 3.17-2
3.17.4 Environmental Consequences....................3.17-7
3.17.5 Proposed Action 3.17-9
3.17.6 Alternative 1 – Resource Integration Alternative....................3.17-18
3.17.7 No Action Alternative 3.17-18
3.17.8 Design Features and Mitigation Measures 3.17-18
3.17.9 Irreversible, Irretrievable, and Residual Impacts....................3.17-19
3.18 Water Resources 3.18-1
3.18.1 Introduction 3.18-1
3.18.2 Analysis Area 3.18-1
3.18.3 Affected Environment 3.18-2
3.18.4 Environmental Consequences....................3.18-4
3.18.5 Proposed Action 3.18-5
3.18.6 Alternative 1 – Resources Integration Alternative 3.18-11
3.18.7 No Action Alternative 3.18-13

3.18.8 Project Design Features and Mitigation Measures 3.18-13
3.18.9 Irreversible or Irretrievable Impacts 3.18-14
Chapter 4. Consultation and Coordination 4-1
4.1 Introduction 4-1
4.2 Public Involvement Process 4-1
4.2.1 Scoping 4-1
4.2.2 Draft RMPA/EIS Public Comment Period and Public Comments 4-1
4.3 Formal Consultation with Tribal Governments 4-2
4.4 Endangered Species Act Section 7 Consultation 4-4
4.5 National Historic Preservation Act Section 106 Consultation 4-5
4.6 U.S. Army Corps of Engineers Section 404 Permit 4-6
4.7 Cooperating Agency Coordination 4-6
4.8 Next Steps in the Planning Process 4-8

List of Tables

Table ES-1 Resource Issues Raised During Input and Scoping ES-3
Table ES-2 Disturbance Definitions ES-6
Table ES-3 Construction Techniques for the Proposed Action and Alternative 1 .... ES-7
Table ES-4 Comparison of Effects Between Alternatives ES-10
Table 1-1 Summary of Project Conformance with the 1998 Las Vegas RMP 1-3
Table 1-2 Resource Issues Raised During Input and Scoping to be Analyzed in Detail 1-7
Table 2-1 Disturbance Definitions 2-3
Table 2-2 Approximate Site Preparation Method Acreages and Percentages for the Proposed Action Array Areas 2-16
Table 2-3 Proposed Action Disturbance in Acres by Project Construction Type 2-16
Table 2-4 Alternative 1 Disturbance in Acres by Construction Area Type 2-19
Table 2-5 Comparison of Construction Techniques 2-26
Table 2-6 Comparison of Alternatives 2-27
Table 3.1-1 Ownership Acres Across Southern Nevada District 3.1-1
Table 3.2-1 Geographic Extent and Cumulative Effects Analysis Area of the Cumulative Projects Considered in Analysis by Resource Topic 3.2-3
Table 3.2-2 Cumulative Renewable Projects Approximate Disturbance Acreages under the Proposed Action Scenario 3.2-6
Table 3.2-3 Cumulative Renewable Projects Approximate Disturbance Acreages under the Alternative 1 Scenario 3.2-6
Table 3.2-4 Past, Present, and Reasonably Foreseeable Future Actions within the Cumulative Effects Analysis Area 3.2-7
Table 3.3-1 Nevada and National Ambient Air Quality Standards for Criteria Air Pollutants 3.3-1
Table 3.3-2 Annual Construction Emissions (tons) without Controls 3.3-5
Table 3.3-3 Estimated Maximum Concentration without Controls During 2024 and 2025 .... 3.3-6

Table 3.3-4 Annual Construction Emissions (tons) with Design Features and Mitigation Measure 3.3-8
Table 3.3-5 Estimated Maximum Concentration with Design Features and Mitigation Measure During 2024 and 2025 .... 3.3-8
Table 3.3-6 Estimated Maximum Concentration at Death Valley National Park with Controls During 2024 and 2025 .... 3.3-9
Table 3.3-7 Annual Construction Emissions (tons) of HAPs without Controls 3.3-11
Table 3.3-8 Operational Emissions Offset (tons per year) 3.3-12
Table 3.3-9 Anticipated Construction Schedule for the Cumulative Projects 3.3-14
Table 3.3-10 Annual Construction Emissions (tons) with Controls – Cumulative 3.3-15
Table 3.3-11 Estimated Maximum Concentration with Controls – Cumulative 3.3-16
Table 3.5-1 Desert Tortoise Population Estimates in the Study Area 3.5-3
Table 3.6-1 Greenhouse Gas Emissions for Nevada and the United States 3.6-2
Table 3.6-2 Estimated Construction Greenhouse Gas Emissions 3.6-3
Table 3.6-3 Operational Emissions Offset Over the Life of the Project (CO2e Metric Tons) 3.6-4
Table 3.7-1 Rough Hat Clark Solar Project Cultural Sites 3.7-2
Table 3.7-2 Historic Properties considered in the VAA Analysis 3.7-9
Table 3.8-1 Summary of Low-income and Minority Thresholds in the Project Area 3.8-3
Table 3.8-2 Summary of Low-income and Minority Populations for Communities within the Project 55-mile Buffer Analysis Area (compared to Nevada data) 3.8-3
Table 3.8-3 Summary of Low-income and Minority Populations for Census Tracts within the Project 6-mile Buffer Analysis Area (compared to non-metro Nevada data) 3.8-4
Table 3.12-1 Recreational Trails in the Project Vicinity 3.12-3
Table 3.12-2 OHV Counter Data by Month 3.12-4
Table 3.13-1 Analysis Area Population (2010 to 2021) 3.13-2
Table 3.13-2 Household Income (2010 to 2021) 3.13-2
Table 3.13-3 Top 15 Clark County Industries by Total Economic Output, 2020 (dollars) 3.13-3
Table 3.13-4 Top 15 Nye County Industries by Total Sales, 2021 (million dollars) 3.13-3
Table 3.13-5 Housing and Occupancy Analysis 3.13-4
Table 3.13-6 Clark County and Nye County Construction Impacts by Type and Category, 2022 Dollars (thousands) 3.13-7
Table 3.13-7 Social Cost of Carbon Associated with Project Construction in 2023 Dollars 3.13-9
Table 3.13-8 Clark County and Nye County Annual Operation Impacts, 2022 Dollars (thousands) 3.13-10
Table 3.13-9 Social Cost of Carbon Associated with Project Operations in 2023 Dollars 3.13-12
Table 3.14-1 Soil Types (Erodible Soils and Corrosive Soils) within the Project Site 3.14-2
Table 3.14-2 Risk of Corrosion of Uncoated Steel and Concrete 3.14-3
Table 3.14-3 Alternative 1 Disturbance Areas Compared to the Proposed Action 3.14-5
Table 3.14-4 Cumulative Renewable Projects Approximate Disturbance Acreages 3.14-11
Table 3.15-1 Level of Service Analysis with Project 3.15-4
Table 3.15-2 Trip Generation Estimates 3.15-7
Table 3.15-3 Background and Cumulative Peak Hour Intersection Conditions 3.15-8
Table 3.15-4 Cumulative Peak Hour Intersection Operations - With Mitigation 3.15-9
Table 3.16-1 Vegetation Communities with the Analysis Area 3.16-2
Table 3.16-2 Cacti and Yucca within the Project Area 3.16-4
Table 3.16-3 Disturbance Levels and Temporal Impacts to Vegetation 3.16-7
Table 3.16-4 Temporary and Permanent Direct Impacts to Vegetation from the Proposed Action 3.16-8

Table 3.16-5 Maximum Impact Potential on Pahrump Valley Vegetation Communities by Existing and Reasonably Foreseeable Solar Projects on BLM-managed Land and Potential Private Land Development 3.16-15
Table 3.16-6 Maximum Impact Potential on Pahrump Valley Vegetation Communities by Existing and Reasonably Foreseeable Solar Projects on BLM-managed Land and Private Land Development 3.16-16
Table 3.16-7 Cumulative Renewable Projects Approximate Disturbance Acreages 3.16-19
Table 3.16-8 Temporary and Permanent Impacts to Vegetation from the Resources Integration Alternative 3.16-20
Table 3.16-9 Maximum Cumulative Impacts Comparisons (only Solar Project Acres) between Action Alternatives 3.16-24
Table 3.17-1 Key Observation Points 3.17-3
Table 3.17-2 VRM Classification Acres within the Southern Nevada District 3.17-6
Table 3.17-3 Criteria for Assessing Visual Impacts and Conformance with BLM VRM Objectives 3.17-8
Table 3.17-4 Summary of Visual Contrast by Project Phase 3.17-10
Table 3.17-5 VRM Classification Acres within the Southern Nevada District 3.17-12
Table 3.18-1 Aquatic Resources Potentially Subject to CWA Section 404 Jurisdiction 3.18-4

ES-1 Introduction

This Proposed Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement (EIS) has been prepared by the U.S. Department of the Interior (DOI) Bureau of Land Management (BLM). This Proposed RMPA/ Final EIS analyzes the effects of and alternatives for the construction, operation, maintenance, and decommissioning of the Rough Hat Clark Solar Project (Project). As described in the Plan of Development (POD) submitted by Candela Renewables, LLC (Applicant), the project would consist of an approximately 400-megawatt (MW) alternating current (AC) solar PV power generating facility, up to 700 MW of battery energy storage, and associated transmission interconnection infrastructure and access road facilities. The BLM has prepared this EIS in accordance with the National Environmental Policy Act of 1969 (NEPA) (Title 42 of the *United States Code* [U.S.C.] 4321 *et seq.*) and the Council on Environmental Quality (CEQ) National Environmental Policy Act Implementing Regulations (Title 40 of the Code of Federal Regulations [CFR] Parts 1500-1508), revised as of May 20, 2022. BLM is the Lead Agency for this EIS pursuant to 40 CFR Part 1502.

ES-1.1 BLM Purpose and Need

To further Congress's direction, DOI must permit at least 25 gigawatts of electricity from wind, solar, and geothermal projects by 2025. Section 3104 of the Energy Act of 2020 directs the Secretary of the Interior to set national goals for wind, solar, and geothermal energy production on Federal land no later than September 1, 2022 and to seek to permit at least 25 gigawatts (GW) of electricity from wind, solar, and geothermal projects by 2025. Additionally, Executive Order 14082 requires federal agencies to prioritize promoting construction of clean energy generation, storage, and transmission, and enabling technologies through efficient, effective mechanisms that incorporate community engagement.

The need for BLM's action (processing the Applicant's application) is to respond to the Applicant's request for a right-of-way authorization to construct, operate, maintain, and decommission the proposed Project in accordance with BLM's responsibility under Title V of Federal Land Policy and Management Act (FLPMA) and 43 CFR Part 2800. The BLM's action of considering the right-of-way (ROW) application also would meet BLM's obligation to contribute towards the legislative and administrative goals of advancing the development of renewable energy production of federal public lands as directed by Section 3104 of the Energy Act of 2020 and Executive Order 14057.

The Project as proposed would not conform to the 1998 Las Vegas Resource Management Plan (RMP) as required by 43 CFR 1610.5-3(a). The BLM would need to amend the RMP to bring it into compliance. In particular, the Applicant's proposed Project does not conform with the management objectives of the Project area's Visual Resource Management (VRM) classification (Class III).

The purpose of BLM's action is to determine if the Applicant's Project and alternatives are consistent with relevant laws, regulations, and policies, and to consider whether to grant, grant with modifications, or deny the ROW. The purpose of the RMPA is to ensure that any development of renewable energy production in the general vicinity of the Applicant's proposed Project area conforms with the RMP's provisions, as provided for in 43 CFR 1610.5-3(c), specifically by reclassifying this geographic area as VRM Class IV.

ES-1.2 Decisions to be Made

The BLM will decide whether to deny the proposed ROW, grant the ROW, or grant the ROW with modifications and whether to approve the RMPA. If the BLM decides to grant the ROW, the grant will include terms, conditions, and stipulations it determines to be in the public interest and may modify the proposed use or change the location of the proposed facilities (43 CFR 2805.10(a)(1)). The BLM's resource management goals, objectives, opportunities, and/or conflicts will be considered in deciding whether to approve or deny this ROW application and RMPA.

ES-2 Consultation and Coordination

Section ES-2 provides a summary of the consultation and coordination for the Project, see Chapter 4 for additional information.

ES-2.1 Public Participation

The BLM published a Notice of Intent (NOI) to prepare an RMPA/EIS for the Project in the *Federal Register* on October 21, 2022, which initiated a 45-day public scoping period for the Project, ending on December 5, 2022. The BLM hosted two virtual public scoping meetings for the Project, one on November 15 and one on November 16, 2022. Forty-one people attended the scoping meeting held on November 15, and 32 people attended the scoping meeting held on November 16. Attendees included representatives from state and local agencies as well as private organizations and individuals. The BLM received 54 emails and letters during the scoping period. A Scoping Report was prepared to summarize the comments addressed (Panorama Environmental, Inc. 2023). The Scoping Report can be found on the BLM's project website: https://eplanning.blm.gov/eplanning-ui/project/2019992/510.

Publication of the Notice of Availability (NOA) of this Proposed RMPA and Final EIS in the *Federal Register* initiates the 30-day protest period under BLM Land Use Planning regulations (43 CFR 1610.2) and NEPA.

ES-2.2 Interagency Consultation and Coordination

ES-2.2.1 Cooperating Agencies

The BLM Las Vegas Field Office sent formal letters to 27 federal, state, and local agencies and 15 Tribes inviting them to become cooperating agencies in the BLM's NEPA analysis of the Project. Eleven agencies accepted the invitation.

ES-2.2.2 U.S. Fish and Wildlife Service

Section 7(a)(2) of the Endangered Species Act of 1973 (ESA) requires federal agencies to ensure that actions they fund, authorize, permit, or carry out will not jeopardize the continued existence of any federally listed species or adversely modify designated critical habitats. The BLM initiated consultation with the U.S. Fish and Wildlife Service (USFWS) on January 12, 2024. The BLM developed a Biological Assessment (BA) to analyze address potential effects to threatened or endangered species, including the desert tortoise. The USFWS has evaluated the BA and formally prepared a Biological Opinion (BO) (File no. 2022-0054972-S7-001). Project implementation is contingent upon compliance with the requirements of the BO.

ES-2.2.3 Section 106 Consultation

Section 106 of the National Historic Preservation Act (NHPA) requires that all federal agencies take into account the effect of undertakings they carry out, license, approve, or fund on historic properties. Specifically, the regulations at 36 CFR 800.8(c), allow a Federal agency to use the NEPA environmental review process to comply with Section 106 of the NHPA in lieu of the procedures set forth in 36 CFR 800.3 - 800.6. The BLM initiated section 106 consultation with 15 Indian Tribes on March 21, 2022. The BLM initiated section 106 consultation with the Nevada State Historic Preservation Office (SHPO) on April 7, 2021 and with Advisory Council on Historic Preservation (ACHP) on March 3, 2022, to identify potential impacts of the Project to Historic Properties.

On March 28, 2023, The BLM invited the Old Spanish Trail Association and the Pahrump Paiute Tribe to be consulting parties. The BLM received two comment letters from ACHP and two comment letters from Nevada SHPO, including recommendations, clarifications, and comments on the BLM's request for SHPO concurrence with National Register eligibility determinations for resources within the area of potential effect. Under Section 106 consultation, the BLM transmitted the BLM response to SHPOs comments on eligibility of resources, along with the Administrative Draft EIS for review, on June 15, 2023. This consultation process is being integrated with the NEPA process for the Project; see Chapter 4 regarding additional information on coordination and consultation (36 CFR 800.8(c)). The BLM has consulted with the SHPO and ACHP, and will continue to consult, regarding the Final EIS consistent with the standards set forth in 36 CFR 800.8(c)(1). Project implementation is contingent upon the completion of consultation.

ES-2.3 Tribal Consultation

The BLM has initiated Government-to-Government consultation with Indian Tribes, pursuant to Executive Order 13175 dated November 6, 2000 (Consultation and Coordination With Indian Tribal Governments); NEPA; American Indian Religious Freedom Act (AIRFA); and Executive Order 13007, Indian Sacred Sites; and consistent with the Solar Programmatic Agreement (2012). See Chapter 4 for a summary of Government-to-Government consultation for the Project.

ES-3 Issue Identification

The BLM conducted internal and external scoping to identify relevant issues that influenced the scope of the Draft RMPA/EIS. Issues raised during scoping by the public and agencies that are relevant to the environmental analysis are detailed in Table ES-1. Issues analyzed in detail have been identified as those issues that are significant and/or are necessary to make a reasoned choice between alternatives.

Table ES-1 Resource Issues Raised During Input and Scoping

Resource topic	Issues raised
Land use and realty	Interested parties suggested the BLM should pause projects within the Pahrump Valley until the Nevada Statewide RMP revision is completed. Interested parties expressed concerns that solar projects would close public lands. Interested parties shared concerns with impacts from the Project on National Landscape Conservation Lands.

Recreation	Interested parties, organizations, and agencies expressed concerns with impacts to lands used for recreation and impacts to recreation experiences on surrounding lands due to changes to the natural setting from the Project, and other proposed projects within Pahrump Valley. Interested parties, organizations, and agencies expressed concerns of impacts to off highway vehicle routes that intersect the Project area.
Water resources	The public requested that the Applicant identify sources of water for Project construction and operation. Interested parties suggested that the Project should only use water through appropriation. Interested parties stated the analysis should address impacts from groundwater withdrawal for the Project, including cumulative impacts and downstream effects. Interested parties and agencies stated that the analysis should consider impacts to ephemeral streams and washes from proposed Project construction and any potential cumulative increase for flooding.
Vegetation and noxious weeds	Interested parties, organizations, and agencies stated the analysis should address impacts on Mojave yucca, cacti, and three-corner milkvetch. Interested parties suggested that the analysis should also consider the differences between the direct, indirect, and cumulative impacts to native plant communities from both utilization of traditional construction techniques and of those techniques that would maintain vegetation resources.
General wildlife and special status species including threatened and endangered species	Interested parties, organizations, and agencies stated impacts to Mojave Desert animal populations and habitat, including burrowing owl (*Athene cunicularia*), Gila monster (*Heloderma suspectum*), bats, kit fox (*Vulpes macrotis*), American badger, general bird species, migratory birds, and ground nesting birds should be addressed. Additionally, interested parties, organizations, and agencies stated that impacts, including populations trends and cumulative impacts, to desert tortoise, a federally listed species, from Project construction, operation, and tortoise translocation, should be considered. Interested parties, organizations, and agencies expressed concerns regarding “lake effect” from solar panels on birds and impacts to wildlife that are attracted to the Project site by nighttime lighting. Interested parties, organizations, and agencies expressed concerns over impacts to insect life. Interested organizations and agencies shared concerns for impacts to wildlife movement across the Pahrump Valley from not only the proposed Project, but also cumulative past, present, and future projects in the area.
Air quality and greenhouse gases/ climate change	Interested parties, organizations and agencies stated the analysis should consider potential impacts from dust generation during construction and operation of the facility, including those that may impact aviation infrastructure. Interested parties, organizations, and agencies expressed concerns for potential impacts to public health due to Valley Fever (*Coccidioides immitis)* and stated the analysis should consider the issue. Additionally, interested parties stated the analysis should consider cumulative impacts from the proposed Project and other past, present, and future projects to climate change and greenhouse gases.
Visual resources	Interested parties suggested that the analysis consider impacts on surrounding views, as well as impacts to night skies from the proposed Project lighting. Interested organizations and agencies stated the analysis should consider impacts due to glare on nearby airports.
Cultural resources	Interested parties, organizations, and agencies stated the analysis should consider impacts to cultural and Native American resources.

Socioeconomic	Interested parties, organizations, and agencies stated the analysis should consider impacts to quality of life and property values in the local communities, including the town of Pahrump.
Environmental justice	Interested parties, organizations, and agencies stated that the analysis should consider disproportionate and adverse impacts to local environmental justice populations from the proposed Project and other surrounding past, present, and future projects.
Public health and safety	Interested parties, organizations, and agencies stated impacts due to increased fire risk from solar panels, battery storage, and general Project construction should be considered, including those impacts to existing disposal infrastructure from decommissioning of the Project. Interested parties, organizations, and agencies suggested that impacts to the environment from potential hazardous materials at the Project site, specifically those potentially associated with battery energy storage systems. Interested parties expressed concerns to public health due to valley fever, which should be considered.
Soils and Paleontology	Interested parties, organizations, and agencies stated the analysis should address potential impacts due to erosion of sensitive soils (cryptobiotic soils) and of desert pavement from the Project. Interested parties, organizations, and agencies suggested the analysis also consider potential impacts to unknown paleontological resources.
Transportation and traffic	Interested parties, organizations, and agencies stated the analysis should address impacts to the existing State Route 160 ROW.
Wilderness	Though there are no wilderness areas in or adjacent to the Project site, interested parties, organizations, and agencies expressed concern for impacts to potential opportunities for solitude within nearby wilderness areas with views of Project features.
Alternatives	Interested parties, organizations, and agencies suggested potential alternatives to the Project, including rooftop solar, locating the Project on already degraded land, and alternatives that reduce potential vegetation disturbance.

ES-4 Proposed Action And 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, no action, and other reasonable action alternatives, as well as provide a comparison of the impacts between the alternatives. The EIS must define the issues such that they can 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. Key resource constraints include habitat for and presence of Mojave desert tortoise, presence of waters of the United States (WOTUS), limited groundwater resources, vegetation at the Project site, and generation of dust.

One action alternative to the Proposed Action was identified for detailed analysis in this RMPA/EIS. Alternative 1 – Resources Integration Alternative was identified in response to issues raised by the public and agency considerations. Alternative 1 still requires a RMPA to the 1998 Las Vegas RMP to modify the existing VRM Class III area to VRM Class IV. BLM regulations require that all actions and authorizations conform to the approved RMP. The Proposed Action and the action alternative cannot be modified sufficiently to conform with VRM Class III.

Several other alternatives were identified and considered but were eliminated from detailed analysis. Additional information on the development and details of the alternatives to the Proposed Action is provided in Chapter 2 including other alternatives considered but eliminated from further analysis and the rationale for eliminating them from detailed analysis.

Many aspects of the Project are similar between the Proposed Action and Alternative 1. The Proposed Action and Alternative 1 include the construction, operation, maintenance, and decommissioning of the Project consisting of the following primary components: 1) 400 megawatt (MW) alternating current solar PV power generating facility; 2) up to 700 MW energy storage system (batteries); 3) linear and ancillary facilities, including access roads, electrical distribution lines, and communication cables; 4) operation and maintenance (O&M) facilities; 5) a substation and a 230 kV generation tie-line (gen-tie) into the existing GridLiance Trout Canyon Substation; 6) acceleration and deceleration lanes and access road on Nevada Department of Transportation ROW; 7) an auxiliary and telecommunications line to feed distribution-level electricity and telecommunications to the construction offices, O&M building, and substation from the existing distribution line north of State Route 160. Additionally, both the Project and Alternative 1 would include a short-term ROW grant on approximately 1 acre for construction tensioning and pulling of the gen-tie line. The Proposed Action and Alternative 1 include project components described in the preliminary POD submitted by Candela Renewables. Candela has an agreement to purchase water from a legal seller within a 5-mile radius of the Project. The agreement includes a "provision obligating the Project to purchase and relinquish water rights in order to offset construction water use. Under this provision, construction water use would be totaled at the conclusion of construction, amortized over the anticipated lifespan of the project, and a matching volume of water rights purchased and retired. At the end of the Project's lifespan, the retirement would ensure Project water neutrality with ongoing benefits to the basin in perpetuity."

The BLM Southern Nevada District Office categorizes disturbance types based on outcomes of construction methods to resources, particularly soils and vegetation (SNDO Restoration Plan Template, 2023). These are abbreviated with a "D" for disturbance, followed by the severity of disturbance. Table ES-2 provides more information about each disturbance level and their typical construction methodology.

Table ES-2 Disturbance Definitions

	D-0	D-1	D-2	D-3
Definition	No impact/ avoidance	Overland travel	Clear and cut/ drive and crush	Clear and cut with soil removal
Disturbance Qualifier	No disturbance	Minimal to moderate disturbance	Moderate to heavy disturbance	Heavy Disturbance

	D-0	D-1	D-2	D-3
Examples/ Construction Types/ Construction Equipment	N/A	Accessing panel arrays using rubber-tired or rubber-tracked vehicles (tractors, side-by-sides, forklifts) or other types of vehicles if they maintain vegetation survival criteria; could include minimal mowing	Front end loader or similar used to clear vegetation; any repeated vehicle traffic that completely crushes vegetation	Disc and roll, grading and filling, trenching

ES-4.1 Proposed Action

The primary difference between the Proposed Action and Alternative 1 is the amount of permanent grading, site preparation methods, and the amount of vegetation maintained onsite, see Table ES-3. Estimates of the construction type are based on full build-out of the 2,469-acre application area. Each site preparation method identified would be implemented for construction. However, the amounts provided are estimates only, and actual amounts would vary based on multiple factors, including but not limited to vegetation type and density, topography, soils, geology, panel and racking manufacturer, energy storage type, and safety considerations.

Table ES-3 Construction Techniques for the Proposed Action and Alternative 1

Disturbance type	General Effects	Proposed Action (acres)	Alternative 1 (acres)
D-0 (avoidance)	No disturbance as the areas would not be developed.	519	520
D-1 (overland travel)	Soil would be minimally compacted by construction equipment. Vegetation would remain intact above ground with the ability to recover after construction. Seedbank is left in place. Effects would be temporary.	0	926
D-2 (clear and cut/ drive and crush)	Soil would be heavily compacted resulting in temporary adverse effects. Vegetation root masses would remain largely intact but would experience slower recovery due to compaction and loss of vegetation. Seed bank remains within the soil but would be buried or compacted. Effects to vegetation would be long-term.	1,301	617
D-3 (clear and cut with soil removal)	Vegetation and soil would be cleared and removed where necessary. Natural regrowth of vegetation would be limited. Soil would be stockpiled, stored, and managed on-site for possible future use. Effects to soils would be longer term and effects to vegetation would be permanent.	649	406

Total	**2,469**	**2,469**

Temporary disturbance areas include temporary workspaces, yards, and staging areas. Restoration efforts in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan would be completed following the completion of primary construction activities and prior to commercial operation date. Permanent disturbance is associated with all long-term Project components needed for O&M of the Project and associated facilities throughout the lifespan of the Project, including the solar modules/arrays, battery energy storage system, roads and access routes, distribution power, substations, gen-tie and transmission infrastructure, and permanent fencing. These areas would not be reclaimed until the end-of-life of the Project at which time reclamation would occur in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan.

ES-4.2 Action Alternative 1 – Resources Integration Alternative

The Resources Integration Alternative is designed to be a Project lifecycle alternative as the alternative addresses not only construction, but also operations, maintenance, and decommissioning of the solar facility. The intent of the Resources Integration Alternative is to minimize disturbance to vegetation and soils within the solar facility by setting maximum allowable disturbance thresholds to vegetation during construction, setting restoration goals, and requiring advanced planning for access throughout the panel arrays. Setting a disturbance cap would ensure a consistent comparison of alternatives and outcomes for NEPA analysis purposes.

The Resources Integration Alternative would include additional construction methods, compared with the Proposed Action:

- **Grading Limits.** Traditional construction methods (grading) for specific facilities would be allowed, but a maximum disturbance threshold on total grading (including for spot grading within panel array blocks) will be established. Grading would be limited to 20-21 percent of the total development areas.
- **Maintains 60 Percent of Perennial Vegetation in Panel Array Blocks.** A maximum disturbance threshold, using perennial vegetation density as a metric, would be established within each panel array block, or development area. This threshold does not include areas that are graded within the panel array block. If more than 40 percent of the perennial vegetation density is permanently impacted within each block of panel arrays, restoration would be required to restore perennial vegetation on-site. In other words, at least 60 percent of perennial vegetation density within these areas must be maintained post-construction.
- **Access Management Plan.** Requires submittal and BLM approval of an Access Management Plan prior to any Notice to Proceed. The Access Management Plan will include access planning and management and must reflect required outcomes being achieved with methodology being utilized.

The Project would be constructed primarily using construction methods that minimize disturbance to topography, soils, and vegetation (Table ES-3). Specifically, the Resources Integration Alternative would implement non-traditional development methods D-1 (Overland Travel), as this construction method is less intensive than traditional methods and is expected to improve the retention of native vegetation, wildlife habitat, soils, seed banks, and biological soil crusts while minimizing air quality (fugitive dust) and water quality impacts. Site specific exceptions to the targets identified in Table ES-3 may occur with the BLM's approval, but only if justification to BLM's satisfaction can be demonstrated based on site specific conditions and construction needs. For example, if topographical features were more challenging than expected, or if subsurface conditions require more vehicle trips for array installation than anticipated.

ES-4.3 No Action Alternative

CEQ regulations (40 CFR 1500–1508) for implementing NEPA require that an EIS alternatives analysis include a No Action Alternative. Under the No Action Alternative, the BLM would not issue a ROW grant or amend the 1998 Las Vegas RMP. The Project would not be constructed, and existing land uses on the Project site would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP.

ES-5 Comparison Of Effects

This section provides a summary of the effects of implementing each alternative. For Climate Change, Cultural Resources, Environmental Justice, Land Use and Realty, Native American Concerns, Public Health and Safety, Recreation, Socioeconomics, Transportation and Traffic, there would be very minimal difference between the Proposed Action and Alternative 1 as described in Chapter 3 of the RMPA/EIS. Table ES 4 provides a comparison of effects by alternative.

Table ES 4 Comparison of Effects Between Alternatives

Effects	Proposed Action	Alternative 1	No Action Alternative
Air Quality			
Impacts to air quality from dust and vehicle emissions	Ground disturbance due to use of construction vehicles would result in fugitive dust and vehicle emissions during construction and decommissioning. Due to loss of vegetation and desert pavement, fugitive dust during operations would be greater than existing conditions until vegetation reestablishes.	**Less compared to Proposed Action.** Almost 50 percent of the Project would retain vegetation and the Project would minimize grading. This would reduce fugitive dust and result in less time for vegetation to reestablish.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Wildlife, Migratory Birds, and Other Special Status Wildlife			
Loss of wildlife habitat including 14 special status bat species, 3 larger mammals, 10 reptile species, and two invertebrates that have potential to occur in the Pahrump Valley. Numerous special status birds may also use the Valley	Loss of 1,950 acres (649 permanent loss from grading and 1,301 acres of permanent and temporary impacts due to drive and crush).	**Less compared to Proposed Action including for special status species.** Permanent loss of 406 acres from grading. Overland travel would occur on 926 acres retaining habitat in these areas.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Impacts to migratory birds including special status species	Visual and auditory effects, grading, drive and crush, and vegetation would result in loss of nesting habitat and reduced foraging area resulting in displacement of birds.	**Less compared to Proposed Action.** Reducing loss of nesting habitat and foraging area would reduce the displacement of birds.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Threatened and endangered species			
Mojave desert tortoise	Loss of 2,469 acres of habitat from fencing of the site and translocating desert tortoise. Loss of vegetation will impact long-term viability of site to provide habitat to the desert tortoise.	**Same as the Proposed Action.** Loss of 2,469 acres of habitat from fencing of the site and translocating desert tortoise. Loss of vegetation will be reduced compared with Proposed Action and may provide improved long-term viability of the site to provide habitat to the desert tortoise.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.

Effects	Proposed Action	Alternative 1	No Action Alternative
Yuma Ridgway's Rail and Southwestern Willow Flycatcher	May impact migrating individuals through mortality due to collision or electrocution.	**Same as the Proposed Action.** Alternative 1 would include the same infrastructure which could result in mortality for migrating individuals.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Soils			
Increased erosion, loss of topsoil, impacts to sensitive soils	Surface disturbances and removal of vegetation during construction would increase the potential for soil erosion. This would occur on 649 acres due to grading and 1,301 acres from drive and crush. Potential adverse effects would be minimized with implementation of the SWPPP or equivalent during construction and through mitigation, including erosion stabilization, during operation. Grading for site preparation could result in loss of topsoil, desert pavement, and biocrusts, and would be minimized through Project BMPs, including topsoil and biocrust salvage.	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation would reduce erosion and loss of topsoil, desert pavement, and biological soil crusts. Surface disturbance and removal of vegetation would occur on 406 acres due to grading and 617 acres due to drive and crush. An estimated 926 acres would be minimally compacted during construction through overland travel and would have temporary impacts to soil.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Vegetation and noxious weeds			
Native vegetation communities and plants	Approximately 649 acres of previously undisturbed native vegetation would be permanently removed by the Proposed Action due to grading. Approximately 1,301 acres would be developed using the drive and crush method where vegetation is scraped off soil surface, crushed, and/or trimmed; seedbank remains in place, albeit buried or compacted. Both grading and drive and crush results in a permanent loss of cacti and yucca.	**Less compared to the Proposed Action.** Minimizes loss of vegetation. Surface disturbance and removal of vegetation would occur on 406 acres due to grading and 617 acres due to drive and crush. An estimated 926 acres would use overland travel techniques which would have temporary impacts on vegetation because if it is crushed, it is expected to recover, and the seedbank is left in place. Cacti and	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.

Effects	Proposed Action	Alternative 1	No Action Alternative
		yucca within direct equipment travel paths are impacted and are trimmed to avoid interference with solar panels but some survive.	
Noxious weeds	Vegetation removal and use of construction equipment and vehicles would facilitate the spread of invasive weeds. The Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan would treat against invasive species, but weeds may persist, resulting in an adverse impact to habitat and wildlife.	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation in solar panel arrays would reduce the opportunity for spreading and new invasions of noxious weeds.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Water Resources			
Surface waters	Grading, soil compaction, and removal of vegetation can alter natural drainage patterns by changing percolation rates and topography of the site. Lack of vegetative cover can also result in an increase in soil erosion and sedimentation as loose soil particles and sands are more easily transported off site via stormwater runoff. Both grading and drive and crush techniques would result in adverse effects to surface waters, but stormwater protection methods and best management practices would reduce the effect.	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation would reduce the potential for soil erosion and flooding.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Groundwater	The Project would require use of 800 acre-feet during construction from an overallocated basin and could result in adverse effects to the groundwater basin and other uses of groundwater including nearby wells and groundwater-dependent springs or vegetation. The Applicant has secured a Water Supply Agreement that obligates the Project to purchase and relinquish water rights to offset the construction water use	**Same as the Proposed Action.** Alternative 1 would require 10 percent less water than the Proposed Action, or 720 acres which could result in adverse effects to the groundwater basin. The Applicant has secured a Water Supply Agreement that obligates the Project to purchase and relinquish	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions. No long term retirement of water allocations.

Effects	Proposed Action	Alternative 1	No Action Alternative
	over the life of the project making the long-term effects neutral or beneficial.	water rights to offset the construction water use over the life of the project making the long-term effects neutral.	
Visual Resources			
RMPA	An RMPA from VRM class III to VRM class IV would allow for new major landscape modifications to be authorized that would potentially attract the attention of the casual viewers on 9,960 acres of BLM administered lands.	**Same as Proposed Action.** Alternative 1 would include the same RMPA from VRM class III to VRM class IV.	**Less compared to the Proposed Action and Alternative 1.** No change from existing conditions.

ES-6 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. The identification of a preferred alternative does not constitute a commitment or decision in principle by the BLM, and there is no requirement for the BLM to select the preferred alternative in the Record of Decision. 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(d)), the BLM has identified Alternative 1, the Resources Integration Alternative, as the preferred alternative.

CHAPTER 1. INTRODUCTION AND PURPOSE AND NEED

1.1 Introduction

This Proposed Resource Management Plan Amendment (RMPA) and Final Environmental Impact Statement (EIS) has been prepared by the U.S. Department of the Interior, Bureau of Land Management, (BLM) to disclose the potential environmental impacts associated with the construction, operation, maintenance, and decommissioning of the proposed Rough Hat Clark Solar Project (Project). The BLM is the Lead Agency under the Federal Land Policy and Management Act (FLPMA) of 1976 and the National Environmental Policy Act of 1969 (NEPA).

1.2 Background and Project History

Candela Renewables, LLC, (Candela Renewables; Applicant) applied to the BLM's Las Vegas Field Office for a right-of-way (ROW) to construct, operate, maintain, and eventually decommission a proposed solar facility and interconnection to the regional transmission system on public land. The Project would include an approximately 400-megawatt (MW) alternating current (AC) solar PV power generating facility, up to 700 MW of battery energy storage, and associated transmission interconnection infrastructure and access road facilities. The Project would be located on approximately 2,469 acres of BLM-managed public land located in the Pahrump Valley in Clark County, Nevada, immediately adjacent the county line, southeast of the town of Pahrump, and approximately 38 miles west of the city of Las Vegas.

The Project is located within a variance area for solar power development as defined in the 2012 Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Solar PEIS) Record of Decision (ROD). Utility-scale solar energy development projects permitted within variance areas are subject to site-specific conditions and are required to comply with NEPA and other applicable laws. The BLM completed the variance process for the Project in coordination with appropriate federal, state, and local agencies and tribes, as well as public outreach. After careful consideration of the variance process requirements, the BLM determined to continue processing the application and proceed with initiation of the NEPA process in May 2022.

Nevada's Renewable Portfolio Standards (RPS) (NRS 704.7801) currently require electricity providers to sell 29 percent of electricity from renewable sources in 2023, 34 percent in 2024 through 2026, 42 percent in 2027 through 2029, and finally, 50 percent in 2030 and each year thereafter. The State of California's RPS requires California's electric utilities to have 60 percent of their retail sales provided by renewable energy resources by 2030 and other state laws establish a goal of supplying 100 percent of electricity demand from renewable energy and zero-carbon resources by 2045. The Project would help provide a new source of renewable energy to serve electricity users in Nevada and/or California.

1.3 BLM Purpose And Need

Federal policies, including Executive Order 14008, encourage actions to increase renewable energy production on public lands. Executive Order 14082 requires federal agencies to prioritize promoting construction of clean energy generation, storage, and transmission, and enabling technologies through efficient, effective mechanisms that incorporate community engagement.

The need for BLM's action (processing the Applicant's application) is to respond to the Applicant's request for a right-of-way authorization to construct, operate, maintain, and decommission the proposed Project in accordance with BLM's responsibility under Title V of FLPMA and 43 CFR Part 2800. The BLM's action of considering the ROW application also would meet BLM's obligation to contribute towards the legislative and administrative goals of advancing the development of renewable energy production of federal public lands.

The Project as proposed would not conform to the 1998 Las Vegas Resource Management Plan (RMP) as required by 43 CFR 1610.5-3(a). The BLM would need to amend the RMP to bring it into compliance. In particular, the Applicant's proposed Project does not conform with the management objectives of the Project area's Visual Resource Management (VRM) classification (Class III).

The purpose of BLM's action is to determine if the Applicant's Project and alternatives are consistent with relevant laws, regulations, and policies, and to consider whether to grant, grant with modifications, or deny the ROW. The purpose of the RMPA is to ensure that any development of renewable energy production in the general vicinity of the Applicant's proposed Project area conforms with the RMP's provisions, as provided for in 43 CFR 1610.5-3(c), specifically by reclassifying this geographic area as VRM Class IV.

1.4 Decisions to be Made

The BLM will decide whether to deny the proposed ROW, grant the ROW, or grant the ROW with modifications and whether to approve the RMPA. If the BLM decides to grant the ROW, the grant will include terms, conditions, and stipulations it determines to be in the public interest and may modify the proposed use or change the location of the proposed facilities (43 CFR 2805.10(a)(1)). The BLM's resource management goals, objectives, opportunities, and/or conflicts will be considered in deciding whether to approve or deny this ROW application and RMPA.

1.5 Authorizing Laws, Regulations, Permits, And Guidelines

The BLM recognizes the importance of state, tribal, and local plans. Applicable laws, regulations, and policies considered in the development of the RMPA/EIS, as well as those major authorizing laws and regulations and applicable permits, are listed in Appendix C. Implementing the Project would also require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the Project. Note that the list included in Appendix C is not all inclusive and the Applicant is responsible for applying for and acquiring permits, as needed.

1.6 Relationship of the Project to BLM Policies, Plans, and Programs, and Land Use Plan Conformance Determination

1.6.1 1998 Las Vegas Resource Management Plan

The 1998 Las Vegas RMP provides management guidance and objectives for public land administered by the BLM Southern Nevada District Office. The Project is located entirely on federal land managed by the BLM Las Vegas Field Office and subject to conformance with the 1998 Las Vegas RMP. Proposed projects are reviewed by the BLM to ensure that the project is in conformance with the RMP objectives and management directions. The Project would conform to the applicable objectives, policies, goals, and requirements of the 1998 Las Vegas RMP with a RMPA as detailed in Table 1-1.

Table 1-1 Summary of Project Conformance with the 1998 Las Vegas RMP

Resource or resource area	Applicable objective, policy, goal, or requirement summary	Summary of conformance
Air resource management	AR-1 – Ensure that actions occurring on BLM-administered lands do not violate local, state, tribal and Federal air quality laws, regulations, and standards	Portions of Clark County, near Las Vegas, are non-attainment. The Project site is located outside the non-attainment area. Project activities would not cause emissions that would violate state or federal ambient air quality standards (National Ambient Air Quality Standards [NAAQs]) as required by the Clean Air Act. The Applicant would obtain a Dust Control Permit for the Project, and the Applicant would implement best management practices to manage fugitive dust. Project activities would be in compliance with applicable local, state, tribal, and federal air quality requirements. Please refer to Section 3.3 for details.
Soils	SL-1 – Reduce erosion and sedimentation while maintaining or, where possible, enhancing soil productivity through the maintenance and improvement of watershed conditions	The Applicant would incorporate Solar PEIS Programmatic Design Features SR-2-1 to the Project to reduce erosion and sedimentation. The Project design avoids the primary washes crossing the site, maintaining some of the watershed conditions.
Water resource management	WT-1 – Maintain the quality of waters presently in compliance with state and/or federal water quality standards; improve the quality of waters found to be in noncompliance	The Applicant would incorporate Solar PEIS Programmatic Design Features SR-2-1, WR-1-1 to the Project to reduce erosion and sedimentation and to clean-up any spills to maintain the quality of waters crossing the Project site or contaminating groundwater.
VRM	VS-1 – Limit future impacts on the visual and aesthetic character of the public lands	The lands affected by the Project are designated as VRM Class III. The Proposed Action would have a moderate impact on the existing character of the landscape. The BLM is considering an RMP Amendment (included in this EIS analysis) which would modify the VRM Class III to VRM Class IV. More information on the RMP Amendment is included in Chapter 2.
Areas of Critical Environmental Concern (ACECs)	AC-2 – Protect areas with significant cultural, natural, or geological values by establishing areas of critical environmental concern	There are no ACECs or conservation lands located in the Project area. No RMP policies, goals, or objectives preclude solar development within the vicinity of ACECs. Project activities would remain in compliance with RMP requirements.

Resource or resource area	Applicable objective, policy, goal, or requirement summary	Summary of conformance
Mojave Desert tortoise	SS-3 – Manage desert tortoise habitat to achieve the recovery criteria defined in the Tortoise Recovery Plan (USFWS 1994)	The Project would be located on desert tortoise habitat. The Project would require a Biological Opinion from the USFWS to ensure it does not result in substantial effects to desert tortoise. The Applicant would incorporate Solar PEIS Programmatic Design Features ER-2-1, SNDO Project Design Feature Gen-1 and Wild-1, and mitigation measures to reduce effects to desert tortoise and their habitat.
Cultural resource management	CR-1 – Identify and protect cultural and paleontological resources in conformance with applicable legislation and BLM policy	Cultural surveys were completed for the Project site. See Chapter 4 for information regarding consultation with the State Historic Preservation Office (SHPO).
Land use and realty	LD-2 – All public lands within the planning area, unless otherwise classified, segregated, or withdrawn, and with the exception of ACECs and Wilderness Study areas, are available at the discretion of the agency for land use leases and permits under section 302 of Federal Land Policy and Management Act	Under section 501 of the FLPMA, the BLM has authority to issue ROW grants for the use, occupancy, and development of public lands.
Recreation	RC-1 – Ensure that a wide range of recreation opportunities are available for recreation users in concert with protecting the natural resources on public lands that attract users	There are no Special Recreation Management Areas (SRMAs) located in the vicinity of the Project area. Off-highway vehicle use in the Project area is limited to existing roads, trails, and dry washes. While not a designated recreation area, the Old Spanish National Historic Trail offers points of interest for recreational users in the Project vicinity. However, no goals, policies, or objectives within the RMP currently preclude solar development within the vicinity of these recreational use areas. The Project would remain in compliance with the applicable recreation objective of the RMP.

1.6.2 Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States

In 2012, BLM and the United States Department of Energy released the Solar PEIS, and a ROD was approved October 2012. The ROD approved the Western Solar Plan that facilitated the permitting of solar energy development projects on federal lands in a more efficient, standardized, and environmentally responsible manner. The 2012 Western Solar Plan establishes locations well suited for utility-scale production of solar energy, known as solar energy zones (SEZs), and designated variance areas on federal land outside of the SEZs but not otherwise excluded for solar development. The 2012 Western Solar Plan amended the 1998 Las Vegas RMP to incorporate these land use designations. Variance areas are evaluated by the BLM on a case-by-case basis.

The Project is sited within a designated variance area and was subject to the variance approval process established pursuant to the 2012 Western Solar Plan and subsequent BLM policies and guidance. The BLM completed the variance process for the Project in coordination with appropriate federal, state, and local agencies and tribes as well as public outreach. After careful consideration of the variance process requirements, the BLM determined to continue processing the application and proceed with initiation of the NEPA process. The NEPA analysis includes a review of the Project to ensure it is consistent with the 2012 Western Solar Plan and incorporates, the management actions and relevant design features. Additionally, this NEPA analysis tiers from the Solar PEIS as noted in Section 1.8.2 below. The BLM is currently updating the 2012 Western Solar Plan and published a draft PEIS on January 19, 2024 (89 FR 3687). Updates to the Solar PEIS are not complete, so the existing 2012 Western Solar Plan and Programmatic Environmental Impact Statement prescriptions are valid and analyzed in this document. To the extent this Project-specific analysis incorporates information from the Solar PEIS, the BLM has conducted a reevaluation to confirm that the underlying assumptions of the analysis have not changed and remain valid.

1.6.3 Final Programmatic Environmental Impact Statement for Vegetation Treatment Using Herbicides in 17 Western States

This RMPA/EIS conforms with and incorporates by reference the 2007 Vegetation Treatments Using Herbicide on Bureau of Land Management Lands in 17 Western States PEIS (2007 Final PEIS) as well as the 2016 Final Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States PEIS (2016 Final EIS).

The 2007 Final PEIS analyzed the effects from 14 herbicide active ingredients on public lands. This analysis included the evaluation of these herbicides on non-target species, including native vegetation and wildlife. The limits and restrictions for use on public lands and standard operating procedures for these herbicides are incorporated by reference.

In the 2016 Final PEIS, fluorxypyr, rimsulfuron, and aminopyralid were added to the list of approved active ingredients for use on public lands. The analysis related to the type of weeds being targeted by the new herbicides, limits for use on public lands, standard operating procedures, and potential impacts to native vegetation and wildlife. The limits and restrictions for use on public lands and standard operating procedures for these herbicides are incorporated by reference.

The 2007 and 2016 Final PEIS documents address a wide range of issues, including the effect of these herbicides on the health of humans, vegetation, fish and wildlife, livestock, and wild horses and burros. The Final PEISs also consider water quality and Native American use of resources and evaluate the cumulative impact of herbicide use by the BLM and other landowners. The Final PEISs provide design features that need to be adhered to when using the herbicides.

Specifically, in incorporating these documents by reference, the BLM will adhere to the mitigation measures outlined in the Appendices to the 2007 and 2016 Final PEIS documents, specifically *Appendix A: Herbicide Use Protocol*, *Appendix B: Herbicide Use SOPs*, and *Appendix C: Endangered Species Act Consultation*. BLM will follow the guidance outlined in *Table 2: Mitigation Measures* (p. 2-5) and *Appendices A-C* (p. A-1-15) of the 2016 Final PEIS ROD.

The BLM incorporates the detailed analysis for the effects of herbicides on animals and plants described in the 2007 Vegetation PEIS and the 2016 PEIS by reference into this RMPA/EIS. The analysis in those documents remain valid as the BLM has conducted a reevaluation to confirm that the underlying assumptions of the analysis have not changed and a Project-specific analysis of herbicide impacts is included in this RMPA/EIS.

1.7 Interagency Coordination

1.7.1 Cooperating Agencies

The BLM Las Vegas Field Office sent formal letters to 27 federal, state, and local agencies and 15 Indian Tribes inviting them to become cooperating agencies in the BLM's NEPA analysis of the Project. Eleven agencies accepted the invitation; three federal agencies, four state agencies, three local agencies, and one Tribe (see Chapter 4 regarding additional information on coordination and consultation).

1.7.2 U.S. Fish and Wildlife Service

BLM's obligations under Section 7 of the ESA include utilizing agency authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species and threatened species. Relevant actions can include providing up-front exclusion areas and design features to protect and assist in recovery of threatened and endangered species, and early coordination with the USFWS to allow development of appropriate conservation efforts. Section 7(a)(2) of the ESA of 1973 requires federal agencies to ensure that actions they fund, authorize, permit, or carry out will not jeopardize the continued existence of any federally listed species or adversely modify designated critical habitats. The BLM initiated consultation with the USFWS on January 12, 2024. The BLM developed a Biological Assessment (BA) to identify potential effects to threatened or endangered species, including the desert tortoise. The USFWS has evaluated the BA and formally prepared a Biological Opinion (BO) (File no. 2022-0054972-S7-001). Project implementation is contingent upon the completion of the BO, the results of the consultation, and compliance with the requirements of the BO.

1.7.3 State Historic Preservation Office

Section 106 of the NHPA requires that all federal agencies take into account the effect of undertakings they carry out, license, approve, or fund on historic properties. Specifically, the regulations at 36 CFR 800.8(c), allow a Federal agency to use the NEPA environmental review process to comply with Section 106 of the NHPA in lieu of the procedures set forth in 36 CFR 800.3 - 800.6. The BLM initiated section 106 consultation with the Nevada State Historic Preservation Office (SHPO) on April 7, 2021, to identify potential impacts of the Project to Historic Properties. This consultation process has been integrated with the NEPA process for the Project; see Chapter 4 regarding additional information on coordination and consultation. The BLM has consulted with the SHPO, and will continue to consult, consistent with the standards set forth in 36 CFR 800.8(c)(1). Project implementation is contingent upon the completion of consultation.

1.8 Scoping and Issue Identification

The BLM conducted internal and external scoping to identify relevant issues that influenced the scope of the RMPA/EIS, including alternatives. Internal scoping was conducted among BLM resource specialists.

The public scoping process provided an opportunity for the BLM to engage members of the public and agencies and allow them to share their concerns about a proposed project.

The BLM initiated the public scoping process with the publication of a Notice of Intent (NOI) to prepare a Draft RMPA/EIS in the Federal Register on October 21, 2022, initiating the 45-day formal scoping period that ended December 5, 2022 (87 FR 64087). The BLM hosted two virtual public scoping meetings on November 15 and November 16, 2022. During scoping, the BLM received 54 comments. Additional detail regarding scoping is described in the Scoping Report (BLM 2023), available online.[1]

Additionally, BLM invited input from the public, state and federal agencies, and Tribes during the variance process for the Project, which was compiled into an input summary report that is available at the Project website[1]. All input received was incorporated into the NEPA analysis for the Project.

1.8.1 Issues Analyzed in Detail in the EIS

Analysis issues presented in Table 1-2 were identified during the variance process and scoping period. The BLM analyzed in detail those issues that are significant and/or are necessary to make a reasoned choice between alternatives.

Table 1-2 Resource Issues Raised During Input and Scoping to be Analyzed in Detail

Resource topic	Issues raised
Land use and realty	Interested parties suggested the BLM should pause projects within the Pahrump Valley until the Nevada Statewide RMP revision is completed. Interested parties expressed concerns that solar projects would close public lands. Interested parties shared concerns with impacts from the Project on National Landscape Conservation Lands.
Recreation	Interested parties, organizations, and agencies expressed concerns with impacts to lands used for recreation and impacts to recreation experiences on surrounding lands due to changes to the natural setting from the Project, and other proposed projects within Pahrump Valley. Interested parties, organizations, and agencies expressed also shared concerns of impacts to off highway vehicle routes that intersect the Project area.
Water resources	The public requested that the Applicant identify sources of water for Project construction and operation. Interested parties suggested that the Project should only use water through appropriation. Interested parties stated the analysis should address impacts from groundwater withdrawal for the Project, including cumulative impacts and downstream effects. Interested parties and agencies stated that the analysis should consider impacts to ephemeral streams and washes from proposed Project construction and any potential cumulative increase for flooding.
Vegetation and noxious weeds	Interested parties, organizations, and agencies stated the analysis should address impacts on Mojave yucca, cacti, and three-corner milkvetch. Interested parties suggested that the analysis should also consider the differences between the direct, indirect, and cumulative impacts to native plant communities from both utilization of traditional construction techniques and of those techniques that would maintain vegetation resources.

[1] The BLM Project website is https://eplanning.blm.gov/eplanning-ui/project/2019992/510

Resource topic	Issues raised
General wildlife and special status species including threatened and endangered species	Interested parties, organizations, and agencies stated impacts to Mojave Desert animal populations and habitat, including burrowing owl (*Athene cunicularia*), Gila monster (*Heloderma suspectum*), bats, kit fox (*Vulpes macrotis*), American badger, general bird species, migratory birds, and ground nesting birds should be addressed. Additionally, interested parties, organizations, and agencies stated that impacts, including populations trends and cumulative impacts, to desert tortoise, a federally listed species, from Project construction, operation, and tortoise translocation, should be considered. Interested parties, organizations, and agencies expressed concerns regarding “lake effect” from solar panels on birds and impacts to wildlife that are attracted to the Project site by nighttime lighting. Interested parties, organizations, and agencies expressed concerns over impacts to insect life. Interested organizations and agencies shared concerns for impacts to wildlife movement across the Pahrump Valley from not only the proposed Project, but also cumulative past, present, and future projects in the area.
Air quality and greenhouse gases/ climate change	Interested parties, organizations and agencies stated the analysis should consider potential impacts from dust generation during construction and operation of the facility, including those that may impact aviation infrastructure. Interested parties, organizations, and agencies expressed concerns for potential impacts to public health due to Valley Fever (*Coccidioides immitis)* and stated the analysis should consider the issue. Additionally, interested parties stated the analysis should consider cumulative impacts from the proposed Project and other past, present, and future projects to climate change and greenhouse gases.
Visual resources	Interested parties suggested that the analysis consider impacts on surrounding views, as well as impacts to night skies from the proposed Project lighting. Interested organizations and agencies stated the analysis should consider impacts due to glare on nearby airports.
Cultural resources	Interested parties, organizations, and agencies stated the analysis should consider impacts to cultural and Native American resources.
Socioeconomic	Interested parties, organizations, and agencies stated the analysis should consider impacts to quality of life and property values in the local communities, including the town of Pahrump.
Environmental justice	Interested parties, organizations, and agencies stated that the analysis should consider disproportionate and adverse impacts to local environmental justice populations from the proposed Project and other surrounding past, present, and future projects.
Public health and safety	Interested parties, organizations, and agencies stated impacts due to increased fire risk from solar panels, battery storage, and general Project construction should be considered, including those impacts to existing disposal infrastructure from decommissioning of the Project. Interested parties, organizations, and agencies suggested that impacts to the environment from potential hazardous materials at the Project site, specifically those potentially associated with battery energy storage systems. Interested parties expressed concerns to public health due to valley fever, which should be considered.

Resource topic	Issues raised
Soils and Paleontology	Interested parties, organizations, and agencies stated the analysis should address potential impacts due to erosion of sensitive soils (cryptobiotic soils) and of desert pavement from the Project. Interested parties, organizations, and agencies suggested the analysis also consider potential impacts to unknown paleontological resources.
Transportation and traffic	Interested parties, organizations, and agencies stated the analysis should address impacts to the existing State Route 160 ROW.
Wilderness	Though there are no wilderness areas in or adjacent to the Project site, interested parties, organizations, and agencies expressed concern for impacts to potential opportunities for solitude within nearby wilderness areas with views of Project features.
Alternatives	Interested parties, organizations, and agencies suggested potential alternatives to the Project, including rooftop solar, locating the Project on already degraded land, and alternatives that reduce potential vegetation disturbance.

1.8.2 Issues Not Further Analyzed in the EIS

CEQ NEPA implementing regulations (40 CFR § 1502.2) directs agencies to include only a brief discussion of issues other than significant issues. The following issues were determined to not be significant and are not analyzed in detail in the RMPA/EIS.

Wild horses and burros. Internal and external scoping yielded comments related to impacts from construction and operations and maintenance of the Project on wild horses and burros and management areas. This was not analyzed in detail because there would be no potential for significant impacts as there are no wild horses or burro management areas overlapping the Project area (BLM 2023). The closest wild horse or burro management area is Wheeler Pass, located across State Route 160.

Acoustics. During scoping, the BLM received comments with concerns about increase in noise from the Project during construction and operations. This issue was not analyzed in detail because the BLM examined noise effects from renewable energy development, including solar project, in the Solar PEIS. BLM anticipates that there would be no potential for the proposed Project to result in effects beyond those disclosed in the Solar PEIS. In general, the information on noise impacts is presented in the Draft Solar PEIS, which remains valid. Draft Solar PEIS page 5-205 (Section 5.13.1.1), states that noise levels from construction would vary with the level of activity, number of pieces of equipment operating, and location and type of activity. The Draft Solar PEIS also notes that most construction equipment has noise levels ranging from 75 to 90 dBA at a distance of 50 feet but in some instances can range to as high or higher than 95 dBA. The Draft Solar PEIS further notes that noise levels would attenuate to about 40 dBA at a distance of 1.2 miles from the construction site which is a typical noise level of daytime rural background levels. Mid- and high-frequency noises (e.g., those generated from construction activities) are significantly attenuated by atmospheric absorption under high-temperature and low-humidity conditions that would be typical for utility-scale solar facilities (Draft Solar PEIS page 5-205).

The nearest sensitive receptor from the Project is approximately 1.25 miles from the Project boundary. Based on the analysis in the Solar PEIS, at this distance, noise levels would attenuate and construction or decommissioning activities at the site would not likely be heard. As such, the change in ambient noise during construction would be temporary, minimal, and would not result in significant impacts. The

Project would not generate substantial noise that could affect residential receptors during operations. Additionally, the Project Applicant will implement applicable Project Design Features from the Solar PEIS, including measures to reduce noise minimize impacts and assess noise impacts from proposed Project activities (Appendix B).

Geology and Minerals. During review of the Project, the BLM identified an issue relating to potential impacts from Project construction on mineral resources in the Pahrump Valley area. This issue was not analyzed in detail because there are no active mining claims or active mining operations within the Project boundary, therefore there is no potential for significant impacts (USGS 1997)(USGS 2023). The Project and surrounding public and private lands are not located within a historical mining district. There are no active mining claims, or active mining operations, within the Project boundary. The public lands within the Project boundary were segregated from appropriation under the public land laws, including the Mining Law, but not the mineral leasing or material sales acts, for a period of 2 years, subject to valid existing rights, on October 20, 2021 (86 FR 58301), and that segregation was extended for an additional two years on October 19, 2023 (88 FR 72103). Further, the Project would obtain all necessary imported mineral materials for construction (gravel, sand, etc.) from permitted existing materials sources. If the Project has excess mineral materials that cannot be used within the Project, a mineral materials contract will be obtained to purchase these minerals through the BLM, Las Vegas Field Office, before they leave the site.

Livestock grazing. During review of the Project, the BLM IDT considered potential concerns with construction and operation of the solar facilities on any permitted livestock grazing within the Project area. This issue was not analyzed in detail as there is no potential for significant impacts. The Project overlaps the BLM Wheeler Wash Grazing Allotment (NV-02028) (BLM 2023). There are no active livestock grazing leases or permits within this grazing allotment where it overlaps the Project. This portion of the allotment does not have any known key forage areas or water sites and development of the solar facility would not result in indirect effects that could preclude grazing elsewhere in the allotment (BLM 2022).

Old Spanish National Historic Trail. Comments submitted during the input period for the variance process and the Project scoping period expressed concerns about impacts to the Old Spanish National Historic Trail from construction and operations and maintenance of solar facilities. This issue was not analyzed in detail because there is no potential for significant impacts as the Project is over 5 miles from the Old Spanish National Historic Trail. The centerline of the Old Spanish National Historic Trail (designated December 2002) is located more than five miles from the Project area. The trail corridor is informally considered by the National Park Service to extend five miles on either side of the centerline of the trail alignment to include the nearest elements of the viewshed, parts of the cultural landscapes, landmarks, and traditional cultural properties near the trail (BLM and NPS, 2017a). Additionally, a Key Observation Point was established at the Stump Springs High Potential Site associated with the Old Spanish National Historic Trail and a visual simulation was prepared. The proposed solar panels are not expected to be visible from the Stamp Springs Key Observation Point based on the results of the simulation. Based on the Project's distance from the Old Spanish National Historic Trail, and the results of the visual simulation prepared from Stump Springs, the Project would not substantially interfere with or be incompatible with the nature and purposes of the Trail.

Lands with wilderness characteristics. During scoping and Project review, concerns about potential impacts from the proposed Project to lands with wilderness characteristics were raised. This issue was not analyzed in detail as there is no potential for significant impacts because there are no lands with wilderness characteristics present in the Project area.

1.9 Resource Management Plan Amendment Planning Criteria

The BLM developed planning criteria to guide the effort to potentially amend the RMP to modify the VRM Class III in and around the Project area, provide a framework for analysis of the RMPA, and lay the groundwork for effects analysis. Issues for Project analysis, including the RMPA and planning criteria, have been identified in Section 1.8 above. The planning criteria for this RMPA include:

- Criteria 1: Any plan amendments will be completed in compliance with the FLPMA, NEPA, and all other relevant Federal laws, executive orders, and BLM polices.
- Criteria 2: Existing valid Las Vegas RMP decisions will not change, and any new plan decisions will not conflict with existing plan decisions.
- Criteria 3: Any resource management plan amendments will recognize valid existing rights.

CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

2.1 Introduction

2.1.1 Right-of-Way Application, Proposed Action, and Resource Management Plan Amendment

The Applicant proposes to construct, operate, and decommission the Project, consisting of an approximately 400 megawatt (MW) alternating current solar photovoltaic (PV) generating facility, up to 700 MW of battery energy storage, and associated transmission interconnection infrastructure and access road facilities on BLM-administered land in southern Nevada. The Applicant is seeking right-of-way (ROW) grants to develop the Project within an approximately 2,469-acre application area. The Project is also seeking a short-term ROW grant on approximately 1 acre for construction tensioning and pulling of the gen-tie line. The Project would be located on federal lands administered by the BLM under the 1998 Las Vegas RMP.

The Proposed Action analyzed in this Proposed Resource Management Plan Amendment (RMPA)/ Final Environmental Impact Statement (EIS) is the Project as presented in the ROW application. The Project site is located approximately 38 miles west of Las Vegas and approximately 3 miles southeast of the town of Pahrump and is bordered on the northeast by Nevada State Route 160 (SR-160), also known as Blue Diamond Road. The regional context is shown in Figure 2-1, and the Project location is shown in Figure 2-2. Figure 2-3 shows the Project elements that comprise the Proposed Action. All figures are shown in Appendix D.

The Proposed Action and the action alternative include a RMPA to the 1998 Las Vegas RMP to modify the existing Visual Resource Management (VRM) Class III area to VRM Class IV. BLM regulations require that all actions and authorizations conform to the approved RMP (43 CFR 1610.5-3(a)). If a specific project cannot be modified sufficiently to conform to the RMP, then the RMP may be amended so that the project can then achieve that required conformance (43 CFR 1610.5-3(c)).

The Proposed Action and the action alternative cannot be modified sufficiently to conform with VRM Class III. Public lands designated as VRM Class III are managed "for partial retention of the existing character of the landscape. In these areas, authorized actions may alter the existing landscape, but not to the extent that they attract or focus attention of the casual viewer (BLM, 1998a)." BLM anticipates that some of the degree of contrast from the Project would be strong, which does not conform to the Class III objectives. The objectives of VRM Class IV allow activities involving major modification of the landscape's existing character; authorized actions may create significant landscape alterations and would be obvious to casual viewers.

The BLM is proposing to amend the RMP to amend the VRM classification of the project area from Class III to Class IV. If approved, the proposed project components would be compatible with VRM Class IV management objectives and therefore in conformance with the RMP. The planning area for the RMPA is the Southern Nevada District Office boundary, and the VRM Class areas designated under the 1998 Las

Vegas RMP. The VRM amendment in relation to the VRM Classes in the Southern Nevada District Office boundary are shown in Figure 2-4.

Based on information received during the variance process for the Project, and the potential for indirect and cumulative effects to visual resources, BLM is proposing to modify the VRM Class III designated lands south of State Route 160 and west of Tecopa Road to the town of Pahrump, Nevada (see Figure 2-5). This area would encompass approximately 9,960 acres of BLM-administered lands. The proposed VRM amendment covers a broader area than just the boundary of the Proposed Action and the action alternative. The area in the proposed VRM amendment also includes the land for which there is demonstrated interest in the development of future solar facilities, including the Yellow Pine Solar Project and the proposed Copper Rays Solar Project. Based on the potential cumulative effects to visual resources, and in the interest of efficiency, the BLM has elected to analyze a broader area currently designated as VRM Class III, for the proposed VRM amendment.

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, no action, and other reasonable action alternatives, as well as provide a comparison of the impacts between the alternatives. The EIS must define the issues such that they can be readily understood by the public and decision makers, thus contributing to a basis for an informed and reasoned decision.

Reasonable alternatives to the Proposed Action were developed by the BLM to avoid or reduce various resource conflicts and meet the purpose and need, per BLM NEPA Handbook § 6.6.1. Key resource constraints include habitat for and presence of Mojave desert tortoise, presence of Waters of the United States (WOTUS), limited groundwater resources, vegetation at the Project site, and generation of dust.

One action alternative to the Proposed Action was identified for detailed analysis in this RMPA/EIS. Alternative 1 – Resources Integration Alternative was identified in response to issues raised by the public and agency considerations (see Project Scoping Report and variance process Input Summary). Additional information on the development and details of the alternatives to the Proposed Action is provided in Section 2.5.4 and the Alternatives Report, including other alternatives considered but eliminated from further analysis and the rationale for eliminating them from detailed analysis. Many definitions and aspects of the Project are similar between the Proposed Action and Alternative 1 and are identified in Section 2.2 and Section 2.3. Several other alternatives were identified and considered but were eliminated from detailed analysis (see Section 2.5.3), based on the following criteria (refer to BLM NEPA Handbook § 6.6.3:

- it is ineffective (it would not respond to the purpose and need).
- it is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology; this does not require cost-benefit analysis or speculation about an applicant's costs and profits).
- it is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan).
- its implementation is remote or speculative.
- it is substantially similar in design to an alternative that is analyzed.
- it would have substantially similar effects to an alternative that is analyzed.

2.2 Definitions

2.2.1 Construction Methods

The BLM SNDO categorizes disturbance types based on outcomes of construction methods to resources, particularly soils and vegetation (SNDO Restoration Plan Template, 2023). These are abbreviated with a "D" for disturbance, followed by the severity of disturbance. Table 2-1 provides more information about the outcomes associated with each disturbance level, and their typical construction methodology. The disturbance intensity increases with each corresponding level; D-0 represents no disturbance and D-3 represents maximum disturbance. There are four disturbance levels (D-0, D-1, D-2, D-3) defined in the latest BLM Restoration Plan Template. These disturbance levels correspond to specific construction methods. D-3 is associated with traditional solar development in the solar panel arrays and associated with construction of other solar facility components (e.g., designated access roads, inverters, substation).

As described further in this Chapter, the BLM's alternatives in this Proposed RMPA/ Final EIS incorporate alternative construction methods including a combination of D-1 and D-2 disturbances, with minimal D-3 disturbance where necessary. The goal of using a combination of lower-impact development methods for construction is to leave vegetation under solar panel arrays within the development areas. Alternative construction methods are expected to improve the retention of native vegetation, wildlife habitat, soils, seed banks, and biological soil crusts while minimizing air quality (fugitive dust) and water resource impacts. The alternative construction method D-1 falls under the second "tier" of the mitigation hierarchy established by BLM (NEPA Handbook § 6.8.4), which is to "minimize impacts by limiting the degree or magnitude of the action and its implementation."

Table 2-1 Disturbance Definitions

	D-0	D-1	D-2	D-3
Definition	No impact/ avoidance	Overland travel	Clear and cut/ drive and crush	Clear and cut with soil removal
Disturbance Qualifier	No disturbance	Minimal to moderate disturbance	Moderate to heavy disturbance	Heavy Disturbance
Examples/ Construction Types/ Construction Equipment	N/A	Accessing panel arrays using rubber-tired or rubber-tracked vehicles (tractors, side-by-sides, forklifts) or other types of vehicles if they maintain vegetation survival criteria; could include minimal mowing	Front end loader or similar used to clear vegetation; any repeated vehicle traffic that completely crushes vegetation	Disc and roll, grading and filling, trenching
Soils	No anticipated effects from construction	Soils are left in place; slight soil compaction	No soil removal or restructuring; soil is very compacted	Soils are removed, restructured, and extremely compacted

	D-0	D-1	D-2	D-3
Vegetation	No anticipated effects from construction	If vegetation is crushed, it mostly survives[1]; seedbank is left in place	If vegetation is crushed, no more than half of the plant is crushed and at least half of the plant remains intact such that it has the ability to survive and continue growing[1]; seedbank is left in place	Vegetation is displaced; seedbank is displaced
Cacti and Yucca	No anticipated effects from construction	Some cacti and yucca removed	All cacti and yucca removed	All cacti and yucca removed

1. Vegetation frequently is able to survive some passes of a vehicle, although the number of passes depends on the vegetation type, the weight of the vehicle, and other factors.

2.2.2 Additional Definitions

Additional definitions for construction techniques are provided below, with Figure 2-6 showing the various definitions as they are proposed to be implemented.

Application Area: The larger area applied for in the ROW application.

Development Area(s)/Project Site: Development areas identified where solar development is planned.

Avoidance Areas/Avoided Features: Areas where solar field development is avoided by site design, such as large drainage features or sensitive habitats, but where linear infrastructure (i.e., road, connector lines, etc.) may be proposed.

Solar Panel Arrays or Blocks: Groups of solar panel rows within the development area(s).

Solar Panel Rows: The linear alignments of solar panels following torque tube alignments.

Access Roads: Internal bladed and compacted roads that would be used to cross the panel arrays or blocks. Access Roads may require use of gravel at high stormwater crossings or other limited areas if requested by Clark County Fire. Access Roads would be used throughout the life of the project.

Drive and Crush Paths: Travel paths would be used to construct the solar panel rows that would use drive and crush to construct the routes. Not all access routes may be used post construction of the project. Access routes may be used post-construction, but only for occasional maintenance and would not generally be maintained.

2.2.3 Solar PEIS and District Project Design Features

The environmental analysis (Sections 3.3–3.18) assumes that all applicable 2012 Western Solar Plan project design features (PDFs), called Solar PEIS PDFs, and District PDFs are incorporated. These measures were used in the environmental analysis of this EIS to determine the potential impacts from Project activities. Revised language and additional measures may be added to final work plans as necessary; however, any modifications or revisions to Project design would require approval from the BLM and any and all applicable permitting agencies. All measures are listed and described in Appendix B and were used to meet the minimum requirements for analysis within the EIS and any modifications or revisions to Project design would need to provide greater or equal protection to environmental resources in order to meet conditions of approval.

2.3 Elements Common to all Action Alternatives

2.3.1 Overview

The Proposed Action and Alternative 1 include the construction, operation, maintenance, and decommissioning of the Project consisting of the following primary components: 1) 400 MW solar PV power generating facility; 2) up to 700 MW energy storage system (batteries); 3) linear and ancillary facilities, including access roads, electrical distribution lines, and communication cables; 4) operation and maintenance (O&M) facilities; 5) a substation and a 230 kilovolt (kV) generation tie-line (gen-tie) into the existing GridLiance Trout Canyon Substation; 6) acceleration and deceleration lanes and access road on Nevada Department of Transportation ROW; 7) an auxiliary and telecommunications line to feed distribution-level electricity and telecommunications to the construction offices, O&M building, and substation from the existing distribution line north of State Route 160. The Proposed Action and Alternative 1 include the following components described in the draft Plan of Development (POD) submitted by Candela Renewables.

2.3.2 Project Components

The Applicant submitted a ROW application to the BLM for an approximately 2,469-acre application area (see definitions in 2.2.2) for the proposed Project. The application area defines the geographic scope of BLM's analysis. Within the Project Site, the development area (see definitions in Section 2.2.2) would occupy approximately 1,950 acres for construction, operation, maintenance, and decommissioning of the proposed solar facility (refer to Figure 2-3). The Project layout has been designed to avoid major washes that transect the Project site, as shown in Figure 2-3, including 519 acres of avoidance areas/avoidance features (see definitions in Section 2.2.2). The Project is bordered on the northeast by SR-160. The Project interconnects with the Trout Canyon Substation at the intersection of SR-160 and Tecopa Road, approximately 1.5 miles southeast of the site. All Project components would be located on lands administered by the BLM. A detailed explanation of each component and its corresponding construction requirements is provided in the draft Rough Hat Clark Solar Project POD dated October 2022, which is incorporated by reference per BLM NEPA Handbook § 5.2.1. The POD is available on the Project's website[1].

Solar PV Modules/Array

The Project is a solar PV energy generating and storage facility. PV modules, set on piles, would convert sunlight into direct current (DC) electricity that is collected and converted to alternating current (AC) electricity though a system of inverters. Medium voltage transformers would convert the AC electricity to 34.5 kV then transfer the energy to a proposed on-site substation, where it would be stepped up with high voltage transformer(s) to 230 kV and then delivered to the Trout Canyon Substation (also known as the Point of Interconnection [POI]) via a new 230 kV gen-tie.

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[1] The BLM Project website is https://eplanning.blm.gov/eplanning-ui/project/2019992/510.

The PV arrays would be constructed using polysilicon or thin film solar modules. Spacing between arrays would be identified in the final design, but the anticipated configuration includes spacing of approximately 20 feet between rows post to post. Clearance distances from panel edge to panel edge for maintenance vehicles and panel access would be less than 20 feet. The height of installed solar modules at top of panel at maximum angle would be approximately 18 feet, while height of installed solar modules when parallel to ground would be up to approximately 12 feet. This configuration would allow a distance of approximately 1.5 feet to 3 feet from bottom of the panels to ground surface at maximum tilt.

An aboveground or underground DC electrical collection system would connect each solar array to Power Conversion Stations (PCS), which include inverter(s) that convert DC power to AC power, medium voltage transformer(s) that step up the voltage to 34.5 kV, and other controls/data equipment. The aboveground electrical collection system may use an aboveground cable management, such as hooks and hangers, to the DC combiner box, but the electrical system would be underground from the DC combiner box to the inverter.

An AC electrical collection system would be installed aboveground or underground in the array areas to deliver electricity from the PCSs to the on-site substation. Collection line poles may be steel or wood and have multiple circuits on poles with insulating conductors.

Current PV technology generates approximately 1 MW of electricity per 5 to 9 acres of land depending on suitability for construction of PV arrays and associated facilities, slope and topography, solar insolation, and other factors. However, PV technology is rapidly improving, and the potential MW/acre may increase prior to the start of Project construction. For purposes of this RMPA/EIS, a 400 MW project is assumed. The exact final project output may be higher or lower depending on the procured panel technology. The Project would have array blocks of 2 MW alternating current or more.

Battery Energy Storage System

The Project includes energy storage of up to 700 MW with lithium-ion battery material. The energy storage system would be either an AC-coupled or DC-coupled system. An AC-coupled system would occupy approximately 70 acres next to the proposed on-site substation and would include equipment enclosures and/or buildings. The AC-coupled system would allow power to be transferred from the solar arrays directly to the energy storage system without being converted. If a DC-coupled system is used, battery units would be stored in containers adjacent to the PCS in each solar array on approximately 22 acres. Power switches and relays would be installed to protect the system. The battery energy storage system could be constructed on a raised platform or on a concrete pad.

Utility-scale battery energy storage systems (BESS) have a risk of thermal events. These events can generate combustible gases which may rapidly combust (deflagrate) if not managed properly and therefore can pose a risk to human safety if appropriate fire mitigation techniques are not implemented. The design, construction, and operation of the energy storage system would follow applicable fire and building codes for its safe design, construction, and operation. The system would be Underwriters Laboratories (UL) tested and would comply with National Fire Protection Association (NFPA) requirements. The Applicant would comply with the more stringent of local code and NFPA 855-2023 to mitigate risks of fires or rapid combustion in BESS units. NFPA 855 is the industry standard fire code and employs a practical large-scale fire test called UL9540A to demonstrate the efficacy of fire detection, suppression, and deflagration management.

The exact fire mitigation system to be used would vary by manufacturer, but any system that complies with NFPA 855 will have a fire suppression system, an NFPA 72 compliant central station fire alarming system and deflagration management complying with NFPA 68/69. Methods used in fire suppression systems include the use of dry agents (e.g., CO2, FM-200, Novec 1230), water mist, high pressure water and a passive fire containment method. The use of dry agents provides rapid fire suppression, but may not address thermal runaway events, as they can be ineffective in extinguishing fires fueled by the high heat and chemical reactions involved in battery thermal events. Water-based interventions can extinguish fires, but risk creating toxic runoff and require significant volumes of water. A code-compliant passive fire containment method primarily uses field-tested spacing between units, which allows the fire to burn while venting gases and preventing fire propagation, leaving only ash for easier cleanup, and reduced environmental impacts.

Linear and Ancillary Facilities

Fencing. The entire Project site will be fenced to meet site security and energy regulatory requirements and in accordance with BLM marking and posting of boundaries requirements during construction and operation. The Project will construct a single fence incorporating both desert tortoise fencing and security fencing around the perimeter of the entire application area, with the first phase of fencing to include the tortoise fence and the second phase to include the security fencing, in order to maximize freedom of movement for (non-tortoise) wildlife across the site.

The height of the perimeter fencing will be approximately 7 feet and may be chain-link or other design. The fence may include three strands of angled barbed wire on the top. The on-site substation and potentially the BESS will be separately fenced. The fence posts will be set in concrete or driven into the ground. Controlled access gates will be located at all entrances to the facility. Fencing will be grounded per industry standards.

The site in general will exclude desert tortoise. Tortoise surveys and translocation would occur in accordance with the final agency-approved Translocation Plan. Desert tortoise exclusion fencing would be installed around the Project site. Tortoise fencing includes tortoise-proof gates or cattle guards with a well-maintained path of escape for tortoises, in accordance with USFWS- and BLM-recommended specifications for desert tortoise exclusion fencing.

Shared fencing. The western boundary of the Project site borders the proposed Copper Rays Solar Project, which, if constructed, requires a perimeter security and desert tortoise fence. To avoid the construction of two perimeter and desert tortoise fences adjoining one another and creating a gap which could entrap wildlife, the Applicant proposes to work with the applicant for the Copper Rays Solar Project to potentially share a single boundary fence between the Project site and the Copper Rays Solar Project, constructed by whichever project commences construction first. Initially, this shared fence incorporates both security fencing and tortoise fencing. Once both facilities have constructed perimeter tortoise fencing and cleared their respective sites of tortoise, there would not be a need for the interior shared fence to include tortoise fencing and the tortoise fencing along this segment of shared fence would be removed. A gap of approximately 8 inches remains between the ground and bottom of the shared security fencing in this area to allow for enhanced non-tortoise wildlife movement.

Similarly, other proposed projects to the south of the Project site, and the existing tortoise fence associated with SR-160, present additional opportunities to reduce the use of tortoise fencing along the perimeter of the Project. The Applicant and BLM would continue to evaluate such opportunities and tortoise fencing would be removed from perimeter fencing when conditions allow in these locations. The Applicant and the BLM would also evaluate potential changes in fence design between neighboring proposed projects which would enhance wildlife movement between the sites compared to traditional security fencing if those proposed projects are authorized.

Access road. The Project site would be accessed by a single direct access point from SR-160. The access point is proposed to be just north of mile marker 40 Clark County. The width of the driveway off SR 160 is proposed to be 20 – 35 feet with an apron radius of approximately 50 feet. The driveway would be paved and include tortoise crossing and trackout control devised as required by BLM. The exact location and design of the driveway is subject to Nevada Department of Transportation (NDOT)- and Clark County Fire Department-approval which is anticipated 3-6 months prior to construction start. Improvements to SR 160 are anticipated given the conditions of SR 160 and the anticipated Project construction traffic. Improvements are anticipated to be an 875-foot southbound right turn lane and an 875-foot northbound left turn lane. Installation of the driveway and improvements to SR 160 required for the Project are expected to occur over a 6-month period. Improvements are anticipated to be made within the existing NDOT ROW. Anticipated ground disturbance is approximately 1 acres within the existing NDOT ROW, which is already disturbed.

A small portion of the proposed roads and access on-site will be paved, primarily the main access driveway, as required by NDOT and Clark County Fire Department. An additional small portion of the proposed roads will be graveled, such as areas around the administration/O&M building and substation. The remaining roads remain unpaved, with select areas for improvement. All roads will be used for construction and maintained for the life of the Project. Project roads have been designed utilizing a main artery road which parallels SR 160 within the Project site with access roads spurring off the main artery road to the southwest. This configuration requires only a single road crossing of the large drainages on site. There are 13 internal roads that extend southwest from the main artery road that total approximately 17 miles in length.

Internal roads and gen-tie roads inside the facility footprint would be 12 feet wide with small pullouts periodically to allow for safe areas for vehicles to pull over and pass, with a 4:1 tie-in slope on either side to accommodate the turning radius of a WB-50 Large Semi-Trailer (maximum 8.5 feet width and 55 feet length). However, the main internal artery road (parallel to SR-160) will be up to 24 feet wide with an apron radius of approximately 50 feet. The internal roads will be bladed and compacted if needed to ensure stability. The internal roads will be crowned or cross-sloped, depending on topography. Internal roads are not planned to be ditched. The Project does not include an interior perimeter road. The interior roads use compacted native materials or gravel surface. Gravel and aggregate will be supplied from commercially available sources produced in the nearby communities, most likely Pahrump or Las Vegas.

Distribution power. Construction power would be provided by Valley Electric Association via distribution line or by on-site generators. Should generators be needed, one 30-kilowatt (kW) and one 45 kW generator would be used during construction. The Project proposes to run the auxiliary power from the existing distribution line on the north side of State Route 160, crossing State Route 160 and entering into the substation. Distribution poles would be up to 75 feet high to safely cross over State Route 160. The overall length of the line before crossing into the Project site would be approximately 600 feet, of which approximately 160 feet would be an overhead crossing of State Route 160. With an estimated disturbance width of up to 30 feet, the overall disturbance footprint would total approximately 0.3 acres, rounded up to 1 acre.

An alternative route for the auxiliary power would be from the existing distribution line on Tecopa Road along the southern boundary of Lot 3 and Lot 4 of Section 2, Township 22 South, Range 55 East (Mount Diablo meridian). The alternative line would run as described from Tecopa Road to the intersection with the Project gen-tie line. From there, the line would be installed on the Project's gen-tie towers within the same footprint as the proposed gen-tie line up to the Project site. Distribution poles would be constructed of wood or steel and up to 30 feet tall. The length of the line between Tecopa Road and the Project gen-tie line is approximately 0.4 miles, with an estimated disturbance width of up to 30 feet, for a total disturbance of approximately 1.5 acres, rounded up to 2 acres. The EIS analyzes up to 2 acres for the auxiliary power as the worst-case scenario.

The distribution line would remain in place for operations as well as construction.

Communication system and meteorological towers. Communication service to the Project will be provided by local service providers and/or a microwave tower up to 120 feet tall. The Project will have on-site communication lines connecting the Project components. A fiber optic line will be included on the gen-tie line between the on-site substation and the interconnecting substation (Trout Canyon Substation). Redundancy in the communication system will be provided as required by the Interconnection Agreement and/or PPA and communications lines will be aboveground or underground.

Two or more permanent meteorological towers (met towers) will be installed on posts approximately 15 feet high within the Project site and would remain during operations. The number of met towers would be determined by requirements in the Interconnection Agreement and/or PPA.

Operations and Maintenance Facilities

O&M building. The Project would include an O&M area that would include offices, water storage, materials storage, and parking within an area of up to 5 acres. The O&M building would potentially have an on-site septic system adjacent to the O&M building. Other facilities, such as a warehouse for materials storage, may be constructed within the O&M area footprint. Plant auxiliary systems would be designed to control, protect, and support the operations and maintenance activities. These systems include the lighting system and the fire protection system.

Septic System. The O&M building would potentially have an on-site septic system designed per County and State standards. The leach field would be approximately 3,000 square feet and located near the O&M facility. The system would be pumped approximately once per year. Installation would require excavation and installation of the leach field (including sand depending on percolation rate of existing soil), burial of the septic tank, and running of lines from the tank to the O&M building.

Lighting System. Permanent outdoor night lighting would be provided at the administration/O&M building, on-site substation, and potentially at the BESS; however, some portable lighting may be required for some maintenance activities that must be performed at night. Lighting would be kept to the minimum required for safety and security. Sensors, switches, and timers would be used to keep lighting turned off when not required, and all lights would be shielded and directed downwards to minimize backscatter and off-site light.

The Project would comply with Federal Aviation Administration (FAA) standards for marking and lighting of structures, if needed. The Project is not expected to include any structures that would require FAA lighting (i.e., over 200 feet).

Fire protection. Fire protection would be necessary during construction and operations. The BLM and local emergency services would have emergency access to the Project site via a locked gate to facilitate response time for wildfire and non-wildfire incidents. A Fire Management Plan would be implemented to reduce fire risk to the Project site and surrounding public lands for the life of the Project. During construction activities, a water truck or other portable trailer-mounted water tank would be kept on site and available to workers for use in extinguishing small human-made fires. All vehicles working on site would also carry a portable fire extinguisher.

Electrical equipment, including inverters, transformers, and battery energy storage equipment, would be housed in appropriately rated National Electric Manufacturers Association (NEMA) enclosures. Vegetation around buildings and equipment would be maintained to minimize fire risk. Project operations would typically have a low risk of introducing fires because the majority of the materials within the solar arrays are non-combustible (i.e., aluminum, steel, or glass). The fire protection systems for operations would include a fire protection water system for the administration/O&M building, portable water tanks, and portable fire extinguishers. The local fire departments would be coordinated with to be able to address battery or electrical fires.

Substation and Generation Interconnect Transmission Line

The Project proposes to interconnect into the existing GridLiance Trout Canyon Substation at the intersection of SR-160 and Tecopa Road. The Project would include a 230 kV on-site substation and a single or double circuit 230 kV generation interconnect transmission line (“gen-tie”), approximately 2 miles in length, to the Trout Canyon Substation. The gen-tie would include overhead and/or underground fiber optic communication lines. The gen-tie would include an access road within the ROW for construction and maintenance. This access road would originate within the solar facility and follow the gen-tie line within the same ROW. The road would be approximately 12-feet wide with minimum 5-foot shoulders and would be composed of compacted native soil. The road would be bladed and compacted if needed to ensure stability. The Project could include a trenched fiber communication line in parallel with the gen-tie between Trout Canyon and the Project. If installed, the fiber communication line would run within a 5-foot area immediately adjacent to the gen-tie access road. The Project will require approximately 1 acre for construction tensioning and pulling of the gen-tie line that would be outside the permanent ROW and will require a separate temporary ROW.

The footprint for the proposed on-site substation would be up to 5 acres. The height of components in the substation varies, with the tallest structure being the gen-tie pole at 120 feet. The on-site substation would be a series of 34.5 kV breakers for collection of power from the solar modules via the electrical collection system (see Section 2.3.2.1 above), a common busbar, and a step-up transformer. The on-site substation and interconnections would be built for 230 kV and would operate at that nominal voltage.

2.3.3 Project Construction

Construction Sequencing

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

- **Geotechnical investigations.** A geotechnical investigation of the Project site would be necessary to finalize engineering specifications.

- **Site preparation.** Site preparation would include identifying boundary corners and markers, land surveying, and site delineation; resource fencing and clearances (including for desert tortoises); trenching and excavation; and dust, erosion, and sediment control. Several incised drainages cross the site due to the presence of existing culverts under SR-160. Incised drainages would be left in place and largely unaltered (avoidance area/avoided features from definitions in Section 2.2.2), and land contours would be preserved to maintain existing site hydrology after construction. Only the main Project arterial road, parallel to SR-160 along the northeast boundary of the site, would cross these incised drainages. A small number of medium-voltage electrical crossings (trenches or underground bores) would also be required. The widths of the avoidance area/avoided features (drainages) vary between 50 feet and 1,600 feet. The solar arrays would be set back at least 25 feet from the edge of the identified drainages.
- **Temporary construction workspace, yards, and staging areas.** Temporary construction workspace, yards, and staging areas would be established to facilitate construction activities and mobilize equipment and materials. Temporary facilities would include areas for construction trailers and parking; storage areas for equipment, materials, recycling, and waste; laydown and assembly areas; pulling/tensioning areas along the gen-tie; and water storage tank(s), generators/power service, and communications used during the construction phase. Temporary disturbance areas would be restored in accordance with a BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan following the completion of primary construction activities.
- **Test Array.** The Project would include a "test array" within the Project boundary that would be utilized to identify opportunities to improve efficiencies and decrease disturbance during construction activities. Ideally, this "test array" would be in an area already designated as requiring a higher level of disturbance based on topographical constraints.
- **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 or aboveground 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. The tracker/mount installations would be constructed using driven steel posts or, possibly, concrete foundations, if required. Drilling into rock may be required if encountered. The preferred mounting configuration utilizes directly embedded driven posts and concrete piers would only be used if subsurface conditions do not support driven posts. Concrete needed for construction of the foundations or other components would be sourced from available commercial sources (likely in Pahrump or Las Vegas). Electrical and instrumentation/control wiring would be installed in underground trenches. The wiring would be run to the location of the solar field controls, and the circuits would be checked.
- **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 gen-tie line would be constructed by using standard transmission line construction techniques. The gen-tie access road would be 12 feet wide and bladed and compacted to ensure stability.
- **Construction of on-site substations.** One on-site substation 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

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 800 acre-feet (98.68 hectare-meters) of water would be required over the Project construction period for construction-related activities primarily for dust control. Water would be purchased from a legal water provider within a 5-mile radius of the Project. Water would be trucked to the site. Candela has an agreement to purchase water from a legal seller within a 5-mile radius of the Project. The agreement includes a "provision obligating the Project to purchase and relinquish water rights in order to offset construction water use. Under this provision, construction water use would be totaled at the conclusion of construction, amortized over the anticipated lifespan of the project, and a matching volume of water rights purchased and retired. At the end of the Project's lifespan, the retirement would ensure Project water neutrality with ongoing benefits to the basin in perpetuity."

Limited quantities of hazardous materials would be used and stored on site, and some wastes would be generated. All waste would be properly disposed of or recycled in accordance with the Resource Conservation and Recovery Act, local 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. A local disposal location for modules and other materials has not been finalized and depends on the exact type and quantity of materials that need disposal. However, there are several local companies and landfills which could potentially accept the materials, including the Nye County Landfill, Republic Services Apex Landfill, Mesquite Landfill, and Nevada Recycling.

The types and quantities of hazardous materials and wastes are provided in the POD for the Proposed Action. Similar quantities of hazardous materials are anticipated for Alternative 1 - Resources Integration Alternative. Temporary utilities would be provided for the construction offices, laydown area, and Project site. Prior to the availability of permanent distribution power, temporary construction power would be provided by Valley Electric Association from local distribution power or would come from temporary diesel generators located in the staging area (see Section 2.3.2.3). Temporary lighting would be provided and strategically located to ensure the safety and security of the construction area.

Construction Method, Workforce, Equipment, and Schedule

The on-site construction workforce would consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The Project would not provide on-site residential areas for construction workers. Construction workers would most likely commute from the Pahrump and Las Vegas areas. During peak construction times, up to 555 workers would be on site. Approximately 400 workers are anticipated for non-peak construction periods. Construction would generally occur between 7 a.m. and 7 p.m., Monday through Friday. During summer hours, construction could begin earlier to reduce work during the hottest hours of the day. During the Project start-up phase, some activities (such as equipment and system testing) may continue 24 hours per day, 7 days per week. Limited construction activities may occur during weekend and nighttime hours.

Construction of the Project is expected to occur over a period of 12 to 18 months, which includes mobilization, construction/installation, commissioning/testing, and demobilization. Certain activities, such as desert tortoise translocation, may be authorized under a Limited Notice to Proceed, which would be outside the 12 to 18 month construction timeframe. Site preparation and the installation of solar equipment is expected to move continuously across the site from one array to the next. Substation and gen-tie construction would occur in parallel with construction of the solar arrays. The Project may be phased as commercially necessary to meet contractual requirements. Construction is anticipated to begin in April 2025, with commercial operation date in May 2027.

Construction Equipment

For ground construction, a crane would be used to erect the gen-tie structures. Typical equipment that would be used for the generation facilities and on-site substation includes the following:

- Tractors
- Excavators
- Graders
- Excavators
- Bulldozers
- Backhoes
- Cutting machines
- Loaders
- Delivery trucks
- Disk/tillers
- Dump trucks
- Trenching machines
- Pile drivers
- Flatbed trucks
- Cranes
- Rollers
- Water supply trucks
- Water spray trucks
- Vibratory rollers
- Pumps
- Forklifts and carry decks
- Electrical test equipment
- Concrete mixers
- Compaction machines
- Survey equipment
- Off-road buggies
- Light trucks

Construction Vehicle Trips

During peak construction times, up to 555 workers would be on site. Approximately 400 workers are anticipated for non-peak construction periods during the typical a.m. and p.m. peak hours. While most workers are expected to arrive and depart during these peak hours, specialty workers are expected to arrive on site during non-peak hours. An average of approximately 5 trucks per day are expected to deliver various materials and construction equipment during non-peak periods. During peak construction (during system installation) there could be up to 50-70 truck deliveries per day. A Traffic and Transportation Plan and Site Access Plan would be prepared prior to construction for review by the BLM.

2.3.4 Project Operations and Maintenance

Following Project construction, the operation of the Project would require up to 10 permanent employees. The workforce would include administrative and management personnel, operators, and security and maintenance personnel. Forklifts and manlifts would be used during routine maintenance activities, estimated to be once per week for 6 hours, or an average of 1 hour per day. Approximately 1 pickup truck or ATV would be used an average of 4 hours per day. No heavy equipment would be used during normal plant operation but would be brought in only when needed for repairs or replacements.

Weed abatement using herbicides or manual and mechanical means would occur in accordance with the approved Integrated Weed Management Plan and Pesticide Use Proposal. Vegetation would be maintained on site through a combination of mowing native species and herbicide application for non-native species. Weed abatement equipment (chemical or mechanical) would be utilized approximately twice per year, for 2 to 3 days per occurrence. Pesticides may be used for certain pests, including hornets and black widows, under an approved Pesticide Use Proposal authorized by the BLM. Refer to the Project's POD in Appendix F for a complete description of O&M activities, which includes materials use and storage. Project fences, road, gen-tie, and drainages would be inspected after significant weather events.

Dust management would be required during O&M activities in accordance with the approved Dust Mitigation Plan. Estimated operational water requirements are 16 acre-feet per year; an estimated 1 acre-foot per year for on-site sanitation and fire suppression systems and 15-acre feet per year for panel washing, if necessary.

2.3.5 Project Termination, Decommissioning, and Site Reclamation

The Applicant is required to post a reclamation bond as a condition of ROW authorization issuance in order to ensure the availability of funds for site decommission and reclamation. The Project's bond would be based on the approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan. The draft Plan would be based on BLM's latest guidance and approved by BLM and finalized based on the selected Alternative prior to issuance of Notice to Proceed. The life of the Project would be approximately 30 years. While it is possible that the Project may be repowered at the end of the 30-year period, for the purposes of the EIS, decommissioning has been analyzed in Chapter 3 for all resources. Prior to termination of the 30-year ROW grant, the Applicant would update the site-specific Site Restoration-Revegetation & Decommissioning-Reclamation Plan.

The Site Restoration-Revegetation & Decommissioning-Reclamation Plan would provide detail regarding the removal of all Project components, reuse of materials to the extent feasible, and site restoration activities to a percentage of reference site conditions. The Site Restoration-Revegetation & Decommissioning-Reclamation Plan would discuss all currently applicable laws, ordinances, regulations, and standards associated with the reuse, safe storage, or disposal of Project materials. The Plan would also include a description of procedures for removal, groundwater required for removal, and for notification of regulatory agencies. Decommissioning typically requires one-third of the workforce, time, and resources as construction of the Project; therefore, it would be expected to occur over 4-6 months and require the support of approximately 130 workers on average. Similarly, water use is estimated to require one-third the amount of construction or 270 acre-feet. The BLM would review the plan prior to approval.

Temporary disturbance areas include temporary workspaces, yards, and staging areas. Restoration efforts in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan would be completed following the completion of primary construction activities and prior to commercial operation date. An additional 1 acre of temporary disturbance is required for pulling and tensioning of the gen-tie line. Permanent disturbance is associated with all long-term Project components needed for O&M of the Project and associated facilities throughout the lifespan of the Project, including the solar modules/arrays, battery energy storage system, roads and access routes, distribution power, substations, gen-tie and transmission infrastructure, and permanent fencing. These areas would not be reclaimed until the end-of-life of the Project and would occur in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan.

2.4 Proposed Action

The majority of the project components for the Proposed Action would be common to all alternatives and are described in Section 2.3. Wildlife openings in the Proposed Action's fence would be specific as follows.

Fence Openings. Openings for non-tortoise wildlife will be 10 inches tall by 12 inches wide per BLM - recommended specifications reviewed by the USFWS. The access holes were designed to allow small to medium-sized mammals use of the site while entirely or largely excluding use by desert tortoise. The bottom of the access holes will be set at 5 inches from the ground to facilitate access into and out of the facility for general species and will be installed within the bottom-half center of a 10 foot by 4 foot screen or tarp secured to the fence to increase visual recognition for wildlife. Wildlife access holes will be installed at an interval of every 0.15 mile along perimeter fences that do not directly share an internal border with adjacent solar facilities. Wildlife access holes will be installed during or immediately following establishment of the perimeter security fence to allow general wildlife species egress and to limit potential mortality from enclosure and subsequent construction activities.

Proposed Action Construction. Two types of site preparation would be used for the Proposed Action: clear and cut/drive and crush (D-2), and clear and cut with soil removal including grading (D-3), see definitions in Section 2.2. The acreages anticipated for each type of site preparation are included in Table 2-2. Maintenance of vegetation during operation is described in the POD (Appendix F). Vegetation would be retained in any areas not directly needed for construction or operation. Vegetation that regrows after construction would be maintained at a height of up to 18 inches during operation; trimming by hand may be used to trim vegetation back to prevent vegetation from impacting the performance of the arrays. Determinations for trimming would be made on an individual solar array basis such that there would be no mass trimming actions on large areas of vegetation. All other vegetation outside of construction and operations areas would be left intact. Site specific exceptions to the targets identified in Table 2-3 may occur with the BLM's approval, but only if justification to BLM's satisfaction can be demonstrated based on site specific conditions and construction needs. For example, if topographical features were more challenging than expected, or if subsurface conditions require more vehicle trips for array installation than anticipated.

Scraping, grading, and leveling would be limited to the extent possible and only for necessary components, such as roads, substation, O&M facilities, temporary construction office complex, temporary laydown areas, and some equipment pads (e.g., battery enclosures). Limited grading would also be necessary for on-site stormwater management features. Grading-like impacts to vegetation are also anticipated where underground trenching is installed. Within the development areas (arrays), clear and cut/drive and crush would be the primary construction methodology, though some limited leveling (spot grading) may be required to overcome individual topographical challenges.

Table 2-2 provides estimated percentages for each site preparation method used for Project construction and Table 2-3 provides disturbance acreage for each site preparation method. Estimates are based on full build-out of the approximately 2,469-acre application area. Each site preparation method identified would be implemented for construction. However, the amounts provided are estimates only, and actual amounts would vary based on multiple factors, including but not limited to vegetation type and density, topography, soils, geology, panel and racking manufacturer, energy storage type, and safety considerations.

Table 2-2 Approximate Site Preparation Method Acreages and Percentages for the Proposed Action Array Areas

Site preparation method	No impacts/ avoidance (D-0)	Clear and cut/Drive and crush (D-2)	Clear and cut with soil removal (Grading)[1] (D-3)	Total application area
Acres	519	1,301	649	2,469
Percent of application area	21%	53%	26%	100%
Percent of development area	N/A	67%	33%	79%

1. Includes arrays, trenching, roads, substation, O&M area, laydown areas, and other areas of permanent impact

Table 2-3 Proposed Action Disturbance in Acres by Project Construction Type

Construction type[1]	Avoidance areas (avoidance areas or avoided features)	Panel array block construction (Includes grading within panel array blocks such as spot grading, inverter pads, etc.)	Facilities, substation, laydown areas, roads	Total
D-0 (avoidance)	490	0	29[2]	519
D-1 (overland travel)	0	0	0	0
D-2 (clear and cut/ drive and crush)	0	1,296[3]	5[4]	1,301
D-3 (clear and cut with soil removal)	0	471	178[5]	649
Total Acres	490	1,767	212[6]	2,469[7]

1. Construction descriptions are found in the Definitions section.
2. Avoided area within the 150-foot gen-tie ROW.
3. Includes 80 additional acres for 80-acre expansion area.
4. Gen-tie pole installation and tensioning sites.
5. Includes 1 additional acre for work within NDOT ROW, 2 additional acres for roads within 80-acre expansion area, and 2 acres for aux power line.
6. Road (46 acres), substation (4.5 acres), BESS (up to 70 acres), miscellaneous (5 acres), and trenching (18 acres for panels and 1 acre for fiber communication line). Also includes 30 acres of laydown areas.
7. Includes updated survey acreage of 2,466 plus 1 acre for work within NDOT ROW and 2 acres for aux power line.

2.5 Alternatives

2.5.1 Action Alternative 1 – Resources Integration Alternative

Background

The Resources Integration Alternative is designed to be a Project lifecycle alternative because it addresses not only construction, but also operations, maintenance, and decommissioning of the solar facility. The intent of the Resources Integration Alternative is to minimize disturbance to vegetation and soils within the solar facility by setting maximum allowable disturbance thresholds during construction, setting restoration goals, and requiring advanced planning for access throughout the panel arrays. Setting a disturbance cap would ensure a consistent comparison of alternatives and outcomes for NEPA analysis purposes. If selected, the BLM would work with the Applicant to ensure these goals are met throughout the construction and operation of the Project.

Fence Openings

The Resources Integration Alternative includes fencing design that differs from that included in the Proposed Action. The entire Project site will be fenced to meet site security and energy regulatory requirements during construction and operation as described in Section 2.3. Wildlife access holes (10 inches tall by 12 inches wide) will be installed within the permanent outer perimeter security and tortoise fencing where these fences are not shared with or bordering those of adjacent solar facilities. The access holes were designed to allow small to medium-sized mammals use of the site while entirely or largely excluding use by desert tortoise. The bottom of the access holes will be set at 5 inches from the ground to facilitate access into and out of the facility for general species and will be installed within the bottom-half center of a 10 foot by 4 foot screen or tarp secured to the fence in order to increase visual recognition for wildlife. Wildlife access holes will be installed at an interval of every 0.15 mile along perimeter fences that do not directly share an internal border with adjacent solar facilities.

Wildlife access holes will be installed during or immediately following establishment of the perimeter security fence to allow general wildlife species egress and to limit potential mortality from enclosure and subsequent construction activities. As these openings will be considered experimental, the BLM may install camera traps to monitor species diversity and volume of use over the initial year of implementation at all or a subset of openings. BLM staff would retrieve data and maintain the cameras once per month over the initial 12-month period. Monitoring may be extended up to 2 years dependent upon the quality and quantity of data collected within the initial trial year.

On-site biologists will monitor these openings at a minimum of twice daily (may drive fence line for monitoring effort) for approximately 2 months to ensure that wildlife are not trapped or caught in the feature prior to the initial review and analysis of camera trap data. Active monitoring of the openings by on-site biologists will not be required by successive solar projects that implement this design. Access holes are expected to be exclusionary to desert tortoise, though the potential for tortoise to traverse the openings may exist and therefore activities within the fenced area should proceed as if tortoise could be present. As a result, tortoise shade structures will be required within the interior of the perimeter fence at intervals mirroring those of shade structures required on the exterior of the perimeter fence.

Once the solar facilities along the western and southern perimeter of the Pahrump Valley are constructed, and if it is determined that tortoises should be granted access based upon habitat condition standards determined by the BLM and USFWS, the wildlife openings would be extended (cut) to the ground along the western and southern perimeters adjacent to open habitat. This would modify the openings from 10 inches by 12 inches to 15 inches by 12 inches, allowing for ingress and egress of general wildlife and desert tortoise. If it is determined that tortoise access should be prohibited at any point after extension, cut sections may be replaced to again allow access only to general wildlife.

Construction Overview

The Resources Integration Alternative would include additional construction methods, compared with the Proposed Action.

- **Grading Limits.** Traditional construction methods (grading) for specific facilities are allowed, but there is a maximum disturbance threshold on total grading (including for spot grading within panel array blocks). Grading would be limited to 20-21 percent of the total development areas.
- **Maintains 60 percent[2] of Perennial Vegetation in Panel Array Blocks.** A maximum disturbance threshold, using perennial vegetation density as a metric, is established across each panel array block as described in Section 2.2.2. This threshold does not include areas that are graded within the panel array block. If more than 40 percent of the existing perennial vegetation density is permanently impacted within each block of panel arrays, restoration is required to restore perennial vegetation on-site. In other words, at least 60 percent of perennial vegetation density within these areas must be maintained post-construction.
- **Access Management Plan.** Requires BLM approval of an Access Management Plan prior to any work authorized by a Notice to Proceed. The Access Management Plan must include access planning and management for internal travel within panel arrays during construction, operations and maintenance, and decommissioning. The Plan must be designed to minimize impacts from vehicle traffic throughout the lifetime of the project such that the 60% vegetation density standard is met and maintained and must reflect required outcomes being achieved with methodology being utilized. Adherence to this Plan will be required as part of compliance for the project.

The Project would be constructed primarily using construction methods that minimize disturbance to topography, soils, and vegetation (Table 2-4). Specifically, the Resources Integration Alternative would implement development methods that include D-1 (Overland Travel), as this construction method is less intensive than grading or disc and roll methods and is expected to improve the retention of native vegetation, wildlife habitat, soils, seed banks, and biological soil crusts while minimizing air quality (fugitive dust) and water quality impacts. Alternative 1 is estimated to use 10 percent less water for construction compared with the Proposed Action, or 720 acre-feet total.

[2] Perennial vegetation standard of 60 percent is from Southern Nevada District Office's Restoration Plan Template (2023), which sets success standards for recovery of desert vegetation. Sixty percent is the minimum standard (relative to pre-existing conditions) required to indicate a site is progressing towards recovery without additional input. This threshold does not include areas that are graded within the panel array block.

Table 2-4 Alternative 1 Disturbance in Acres by Construction Area Type

Construction type[1]	Avoidance areas (avoidance areas or avoided features)	Panel array block construction (Includes grading within panel array blocks such as spot grading, inverter pads, etc.)	Facilities, substation, laydown areas, roads	Total
D-0 (avoidance)	491	0	29[2]	520
D-1 (overland travel)	0	926[2, 3, 4]	0	926
D-2 (clear and cut/ drive and crush)	0	612[5]	5[6]	617
D-3 (clear and cut with soil removal)	0	228	178[7, 8]	406[9]
Total acres	491	1,766	212	2,469[10]

1. Construction descriptions are found in the Definitions section.
2. Avoided areas within 150’ gen-tie ROW.
3. Includes addition of 48 acres of D-1 and 32 acres of D-2 for 80-acre expansion area.
4. Equals 60 percent of the development area that is not being graded.
5. Equals 40 percent of the development area that is not being graded.
6. Gen-tie pole installation and tensioning sites.
7. Includes 1 additional acre for work within NDOT ROW, 2 additional acres for roads within 80-acre expansion area, and 2 acres for aux power line.
8. Road (46 acres), substation (4.5 acres), BESS (70 acres), miscellaneous (5 acres), and trenching (18 acres for panels and 1 acre for fiber communication line). Also includes 30 acres of laydown areas.
9. Equals 21 percent of the total development area.
10. Includes updated survey acreage of 2,466 plus 1 acre for work within NDOT ROW and 2 acres for aux power line.

Construction

Clear and cut with soil removal (D-3). Scraping, grading, and leveling would be limited to the designated main access road, on-site substation, O&M facilities, temporary laydown areas, and equipment pads (e.g., inverters, battery enclosures). The maximum disturbance threshold for D-3 activities would be set at 20 to 21.5 percent of the total development area(s) (e.g., panel array blocks, access roads, O&M facilities, battery storage), including spot grading needed for topographical constraints (Refer to Section 2.2.2).

Panel Array Blocks: 60% Overland Travel (D-1), 40% Drive and Crush (D-2). Within each block of panel arrays, topography, soils, and vegetation would be left in place, and installation of solar array components would occur over these existing resources.

Within the panel array blocks, a mixture of overland travel and clear and cut/drive and crush techniques would be used for construction. Drive and crush effects are anticipated where multiple vehicle trips are made along the same path. A maximum of 40% of perennial vegetation density would be impacted through drive and crush techniques, not including the graded areas. Sixty percent of the vegetation density is required to be maintained in the panel array blocks, not including the graded areas. If vegetation is crushed through overland travel in the array blocks, it is anticipated it would recover.

If spot grading is needed within the block, that spot grading would be counted towards the maximum grading disturbance threshold of up to 21 percent. However, graded areas would not be included in sampling of the impacted perennial vegetation within each panel array block.

Access Management Plan. An Access Management Plan describing drive and crush paths within panel arrays and proposed access routes or travel paths to meet the standards outlined herein would be submitted to BLM for review and approval prior to (Limited) Notice to Proceed. BLM has included best management practices (Appendix F) based on experience with other projects and adaptive management techniques for access for recommended inclusion in the Access Management Plan.

Drive and Crush Access Routes. Internal travel paths or turnouts from large equipment must be minimized during construction to limit unnecessary disturbance to vegetation. If not needed during O&M, travel paths and turnouts must be decompacted after construction to facilitate restoration.

Best Management Practices. BLM recommends BMPs specific to the Resources Integration Alternative which are presented in Appendix F.

Operations and Maintenance

During operations and maintenance, the drive and crush paths identified in the Access Management Plan and used during construction within the panel arrays will continue to be used to access the site and equipment. Vehicle trips between panel array blocks will be limited to the established access roads and vehicular access will occur in the smallest possible vehicle to complete the activity, or when possible, on foot. Vehicle traffic will avoid any vegetated areas to the maximum extent possible. If vegetation reaches a height where it is interfering with panel operation, it may be trimmed back to no lower than 18 inches.

Decommissioning

Decommissioning will consist of removing all materials from the site. The drive and crush paths through the panel arrays will be used to transport materials out of the panel arrays, to the maximum extent possible. The minimum disturbance guidance and prescriptions for construction of the site also applies to decommissioning of the site. If more effective prescriptions are available at the point of decommissioning, these would be used to further minimize disturbance to the site. Additional information on decommissioning is included in the Site Restoration-Revegetation & Decommissioning-Reclamation Plan.

Site Restoration-Revegetation & Decommissioning-Reclamation Plan Protocols for inventorying the percentage of vegetation crushed during construction and decommissioning is included in the Restoration Plan. Vegetation would have up to 2 years to recover within each solar array block after construction is completed or commercial operations for an area commences (whichever is shorter), which would allow time for vegetation to resprout and regrow after being crushed.

If more than 40 percent of the perennial vegetation density has been impacted within each block of panel arrays, restoration would be required within disturbed areas to restore perennial vegetation density within each array to 60 percent of reference site or baseline conditions. If there is a documented drought during the 2-year period, BLM would evaluate extending the restoration time period if success standards are not being met, to allow for natural recovery of the site.

To monitor restoration success within solar panel arrays, given the large project areas and the site variability within the areas, a sampling design with adequate statistical power would be implemented to evaluate success criteria within each panel array block after the 2-year interim period.

2.5.2 No Action Alternative

CEQ regulations (40 CFR 1500–1508) for implementing NEPA require that an EIS alternatives analysis include a No Action Alternative. Under the No Action Alternative, the BLM would not issue a ROW grant or amend the 1998 Las Vegas RMP. The Project would not be constructed, and existing land uses on the Project site would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP.

2.5.3 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required under NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternative from detailed study (40 CFR 1502.14). The alternatives that were considered during the development and scoping phases of the project but eliminated from detailed analysis are described below. Additional information on the alternatives considered but eliminated are provided in the *Alternatives Report* which is available at the project website: https://eplanning.blm.gov/eplanning-ui/project/2019992/510.

Setback Alternative (Visual Impacts)

BLM recommended an alternative that would have increased the setback from SR 160 for the on-site substation and O&M building to minimize potential visual impacts to vehicular users of SR 160. The Applicant considered the proposed setback during site design and incorporated recommendations into the Proposed Action. The Proposed Action could not achieve the full recommended setback distance due to site constraints and technical infeasibility. The Applicant noted that moving the substation and associated gen-tie alignment would result in potential shading of solar panels, reducing the amount of energy the Project could produce. However, the O&M building was moved under the Proposed Action approximately 500 feet from SR 160 and the on-site substation remained at the location originally proposed. Because moving the on-site substation further from SR 160 would not be technically feasible, this alternative has not been carried forward for detailed analysis.

Reduced Project Footprint Alternative

Scoping comments recommended the BLM examine a Project of reduced size. Alternatives to the Project size were considered but eliminated from detailed analysis as the potential impacts would be substantially similar to alternatives already analyzed in detail. The BLM examines reduced project footprints to minimize potential impacts to resources, such as wildlife, hydrology, cultural resources, etc. However, the proposed Project already avoids development in approximately 519 acres to protect existing drainages within the Project boundary. The BLM also incorporated these avoidance areas into the BLM developed Action Alternative 1. Because the Proposed Action and Alternative 1 already avoid development in 519 acres to minimize impacts to drainages and other resources, the BLM determined no additional reduction in project footprint would be necessary for resource protection and impacts would be similar to those under the Proposed Action and alternatives.

Additionally, the Applicant proposed a fencing method for the Project that would fence individual panel array areas across the Project area, reducing the footprint by leaving the drainages completely outside of the Project area. Through conversations with wildlife management agencies (USFWS and Nevada Department of Wildlife), the BLM decided not to consider this fencing alternative in detail in favor of a design that reduces the number of fence lines wildlife would need to traverse across the Project area, thus reducing impacts to wildlife species that would continue to utilize the Project area. The Applicant modified their project design to accept the recommendation of the agencies.

Area of Critical Environmental Concern Alternative

During scoping, the BLM received comments recommending establishing an Area of Critical Environmental Concern (ACEC) for desert tortoise habitat during the RMPA/EIS process for the Project. This alternative is eliminated from detailed analysis because it does not meet the BLM's purpose and need to respond to an application for a solar project ROW.

Although it is beyond the scope of this analysis, the BLM nonetheless considered whether an ACEC to protect desert tortoise habitat in this area would be appropriate. The BLM evaluates ACEC proposals through the land use planning process, including land use plan amendments for which ACEC evaluation and designation are within the scope of the amendment.[3] 43 CFR 1610.7-2(b). Although ACEC evaluation and designation are not within the scope of the proposed land use plan amendment associated with this Project, the regulations provide for consideration of ACEC proposals received outside of the planning process. 43 CFR 1610.7-2(i). Under that provision, the BLM has discretion to determine when it will evaluate whether the area has relevant and important values, and needs special management attention, including by deferring the evaluation to an upcoming planning process. 43 CFR 1610.7-2(i). Once the BLM undertakes that evaluation, and if the area has relevant and important values and needs special management attention, the State Director shall, at their discretion, either initiate the planning process, or provide temporary management consistent with the applicable resource management plan. 43 CFR 1610.7-2(i)(1)(i)-(ii). Here, even though the BLM did not receive a specific ACEC proposal, the BLM exercised its discretion to consider a potential desert tortoise ACEC during this Project review.

The BLM determined that an ACEC for desert tortoise habitat would be inconsistent with the BLM policy objectives related to the identification, evaluation, and designation of ACECs (MS-1613.21(E), BLM IM 2023-013). Nonetheless, the BLM reviewed this recommendation in accordance with the BLM ACEC Manual 1613 and IM 2023-013, Clarification and Interim Guidance for Consideration of Areas of Critical Environmental Concern Designations in Resource Management Plans and Amendments. However, as the BLM had not received a formal recommendation for an ACEC, the BLM considered the Rough Hat Clark and Copper Rays project site application boundaries using the ACEC Manual 1613 and IM 2023-013 for desert tortoise. The BLM determined that desert tortoise habitat in the Project area had "relevance" based on presence throughout the Project area (43 CFR § 1610.7-2(a)(1), MS-1613.11(A)), but did not meet the "important" criterion (43 CFR § 1610.7-2(a)(1), MS-1613.11(B)). The desert tortoise habitat in the Project area did not meet the "Important" criterion because the habitat within the project area is not geographically unique or uncommon across the range of the Mojave Desert, and habitat connectivity

[3] On June 10, 2024, the BLM's Public Lands Rule (89 FR 40308) went into effect. The rule codifies existing policies regarding the identification and consideration of areas proposed for an ACEC designation. Regardless of whether the new rule applies here, the BLM's steps in reviewing a potential ACEC demonstrate compliance with the new rule.

would not be severed if the area is developed because sustainable connectivity would remain throughout a significant geographical area in the Pahrump Valley, including the Stump Springs Regional Augmentation site and the Trout Canyon Translocation area that serve as protection areas for desert tortoise genetic connectivity and habitat. Both the Stump Springs Regional Augmentation site and Trout Canyon Translocation area are excluded from renewable energy development under the 2012 Western Solar Plan. For these reasons, the BLM determined an ACEC should not be analyzed for the Project area. The BLM's steps in reviewing the ACEC proposal demonstrate compliance with BLM Manual 1613 and existing policies.

Since publication of the Draft RMPA/EIS, the BLM received a formal nomination for an ACEC covering the Rough Hat Clark site. As part of Master Response #3 in the Proposed RMPA/Final EIS, the BLM reviewed this recommendation in accordance with the BLM ACEC Manual 1613 and IM 2023-013, Clarification and Interim Guidance for Consideration of Areas of Critical Environmental Concern Designations in Resource Management Plans and Amendments for the Rough Hat Clark site and again determined that the site either did not have "important" criterion for some of the values and for the values that were determined to be "important" at the site, the Project site did not have "relevance". See Master Response #3 in Appendix G for additional details.

Reintroduction of Desert Tortoise (Wildlife – Threatened and Endangered Species) Alternative

Scoping comments proposed an alternative that would allow for the reintroduction of desert tortoise in the Project area post construction. Given the potential cumulative use of the Pahrump Valley for renewable energy, agencies have determined translocation of desert tortoise to the Stump Springs Regional Augmentation Site is preferred to meet the long-term goals outlined in the Desert Tortoise Recovery Plan (USFWS 2011) and guidance from FWS for translocation plans (U.S. Fish and Wildlife Service 2020). More specifically, the BLM considered the following factors when determining not to analyze an alternative including reintroduction of desert tortoise after project construction in detail:

- Habitat within and adjacent to the Pahrump Valley solar project areas would not be sufficiently intact for desert tortoise reintroduction because of the number of projects proposed in a concentrated area, the proximity to the city of Pahrump, State Route 160, tortoise fencing along Tecopa Road for the Stump Springs translocation area, and the lack of habitat in the badlands and dry lakebeds closer to the California border.
- To maintain long-term desert tortoise priority one connectivity habitat, the Stump Springs Regional Augmentation Site is being maintained as a connectivity corridor between California and Nevada and connects with the west slope of the Spring Mountains, east of Highway 160, for north-south desert tortoise connectivity in Nevada.
- Desert tortoises do not coexist well with human development and disturbances and would be unlikely to persist in the area following construction. Studies have shown that tortoises are essentially absent from habitat within 1 km of areas with greater than 10 percent development, including urban development, cultivated agriculture, energy development, surface mines and quarries, pipelines and transmission lines, and roads and railroads.

The minimal amount of suitable desert tortoise habitat adjacent to the sites would not be enough for reintroduction to the project areas, if authorized, post-construction. Due to the number of proposed projects within the Pahrump Valley, it was determined translocation without considering reintroduction to the area would be most beneficial to desert tortoise.

However, Alternative 1, the Resources Integration Alternative, does analyze the effects to desert tortoise from passive reoccupation of the Project site by tortoise inhabiting undisturbed habitat adjacent to the Project area. The Resources Integration Alternative requires maintenance of 60% of the perennial vegetation density within solar panel arrays throughout the site. The Alternative analyzes the potential effects to desert tortoise if, after the site has recovered to support sufficient perennial vegetation cover, wildlife openings are modified to allow desert tortoises from adjacent habitat to passively reinhabit the site.

Private Land Alternative

The BLM considered an alternative that would locate the proposed Project on private land but eliminated it from detailed analysis for several reasons. Much of the available private land in the region is parcelized 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 mass in Nevada is owned by the federal government, limiting the amount of available private land available for development while increasing the cost of that land.

Development of the Proposed Project on private land would not meet BLM's purpose and need for action because the BLM has no jurisdiction to authorize projects located on private lands. While the BLM could analyze a Private Land Alternative, the effects to the proposed Project site would be the same as the No Action Alternative. This alternative also would not meet BLM's purpose and need for action to advance the development of renewable energy production of federal public lands, and Executive Order 14057, which to directs Federal agencies (including BLM) to "lead by example in order to achieve a carbon pollution-free electricity sector by 2035…".

Other BLM-Administered Land Alternatives

The BLM considered an alternative that would locate the proposed Project on another location on public lands but eliminated it from detailed analysis for several reasons. Most BLM-administered land in the Pahrump Valley was eliminated from consideration because it was not available for the Project as there are other solar project applications within the Pahrump Valley, BLM-designated areas of critical environmental concern, and areas that do not meet the slope requirements for solar development included in the Solar PEIS. Site selection was ultimately based on opportunity, available acreage, flat topography, proximity to the SR 160, and existing major transmission infrastructure with available capacity adjacent to the site.

While the Southern Nevada District Office administers over 3.3 million acres of federal land, solar development, including those sites currently operating, under construction, or applications submitted, already covers 180,000 acres of the BLM-administered land. Over 9,300 acres of BLM-administered land in the district is under construction for solar development and over 4,800 acres of BLM-administered land in the district is under operations and maintenance for solar development. Additionally, over 2.7 million acres[4] of BLM-administered lands within the district are either protected or have other existing authorizations proposed or in use. As such, minimal acres of BLM-administered land where solar development would not be prohibited is available. Given the large number of pending and authorized

[4] These acres include Areas of Critical Environmental Concern, Wilderness Areas, Wilderness Study Areas, National Conservation Lands, National Monuments, Critical Habitat, Solar PEIS Exclusionary Areas, existing authorizations and operations, wind project application areas, and Mojave desert tortoise translocation areas.

applications on other BLM-administered lands where solar development is not prohibited, other BLM-administered lands were considered but eliminated from detailed study.

Brownfield/Degraded Lands Alternatives

The U.S. Environmental Protection Agency tracks 480,000 contaminated sites for potential reuse for renewable energy development as part of its RE-Powering America's Lands Initiative.[5] Of those sites, 190,000 sites were pre-screened by EPA as having renewable energy development potential. In the Southern Nevada District Office, there are 11 sites located on BLM-administered lands, totaling approximately 642 acres across the District, with the largest individual site of 427 acres. Although it is possible to develop solar energy on these contaminated sites, this alternative was not analyzed in detail because the contaminated sites are too small to support a 400 MW Project, with appropriate access to transmission lines and substations with adequate capacity.

Solar Thermal Power Generation

Solar thermal energy is a form of energy production that uses high-temperature collectors to concentrate solar radiation (sunlight) onto mirrors or lenses. Solar thermal technologies include solar power towers and parabolic troughs. One of the primary reasons for rejecting the solar thermal power option is that the economic feasibility of solar thermal is no longer cost competitive to solar PV. According to the National Renewable Energy Lab, in 2023, the levelized cost of energy of solar PV was less than half that of solar thermal technologies (NREL 2023). A solar thermal project would have similar or considerably greater environmental impacts related to biological resources, including on birds; water consumption, as mirrors require washing; and visual impacts associated with glare from the mirrors and the high visibility of the tall power towers. Thus, this alternative was not carried forward for detailed analysis as this type of energy production is not economically feasible and would not result in greater resource impacts.

Distributed Generation

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). The BLM has jurisdiction over only those public lands managed by the BLM. The BLM does not have jurisdiction over private lands or facilities. Also, the policies and legal basis for distributed generation are administered and regulated by Public Utility Commission of Nevada under Nevada State law. Further, the challenges associated with the implementation of a distributed solar technology include widely varying codes, standards, and fees; environmental requirements and permitting concerns; interconnection of distributed generation; inefficiencies and lack of storage; and integration of distributed generation.

An alternative involving distributed generation was eliminated from detailed analysis because it would not meet the BLM's purpose and need for the proposed action, which is to respond to the Applicant's application for a ROW grant to construct, operate, and decommission a solar PV facility on public lands in compliance with the FLPMA, BLM ROW regulations, and other applicable federal regulations. Additionally, distributed generation would not meet the BLM's goals to promote the responsible production of renewable energy on BLM-administered lands.

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[5] https://www.epa.gov/re-powering

Conservation and 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. Conservation and demand-side management approaches also were eliminated from detailed consideration because they would not meet the BLM's purpose and need to respond to the Applicant's application under Title V of the FLPMA for a ROW grant to construct, operate, maintain, and decommission a solar PV facility on public lands. Additionally, conservation and demand-side management would not meet the BLM's goals to promote the responsible production of renewable energy on BLM-administered lands. Furthermore, the BLM has no authority or influence over energy conservation and demand-side management other than on lands that it administers.

2.5.4 Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. For Climate Change, Cultural Resources, Environmental Justice, Land Use and Realty, Native American Concerns, Public Health and Safety, Recreation, Socioeconomics, Transportation and Traffic, and Visual Resources there would be very minimal difference between the Proposed Action and Alternative 1 as described in Chapter 3. The No Action Alternative would have no changes compared with the existing conditions. Table 2-5 compares the acres of construction techniques for the Proposed Action and Alternative 1. Table 2-6 provides a comparison of effects by alternative.

Table 2-5 Comparison of Construction Techniques

Construction type	General Effects	Proposed Action (acres)	Alternative 1 (acres)
D-0 (avoidance)	No disturbance as the areas would not be developed.	519	520
D-1 (overland travel)	Soil would be minimally compacted by construction equipment. Vegetation would remain intact above ground with the ability to recover after construction. Seedbank is left in place. Effects would be temporary.	0	926
D-2 (clear and cut/ drive and crush)	Soil would be heavily compacted resulting in temporary adverse effects. Vegetation root masses would remain largely intact but would experience slower recovery due to compaction and loss of vegetation. Seed bank remains within the soil but would be buried or compacted. Effects to vegetation would be long-term.	1,301	617

D-3 (clear and cut with soil removal)	Vegetation and soils would be cleared and removed where necessary. Natural regrowth of vegetation would be limited. Soils would be stockpiled, stored, and managed on-site for possible future use. Effects to soils would be longer term and effects to vegetation would be permanent.	649	406
Total		**2,469**	**2,469**

Table 2-6 Comparison of Alternatives

Effects	Proposed Action	Alternative 1	No Action Alternative
Air Quality			
Impacts to air quality from dust and vehicle emissions	Ground disturbance due to use of construction vehicles would result in fugitive dust and vehicle emissions during construction and decommissioning. Due to loss of vegetation and desert pavement, fugitive dust during operations would be greater than existing conditions until vegetation reestablishes.	**Less compared to Proposed Action.** Almost 50 percent of the Project would retain vegetation and the project would minimize grading. This would reduce fugitive dust and result in less time for vegetation to reestablish.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Wildlife, Migratory Birds, and Other Special Status Wildlife			
Loss of wildlife habitat including 14 special status bat species, 3 larger mammals, 10 reptile species, and two invertebrates that have potential to occur in the Pahrump Valley. Numerous special status birds may also use the Valley	Loss of 1,950 acres (649 permanent loss from grading and 1,301 acres of some permanent and some temporary impacts due to drive and crush).	**Less compared to Proposed Action.** Permanent loss of 406 acres from grading. Overland travel would occur on 926 acres retaining habitat in these areas.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Impacts to migratory birds including special status species	Visual and auditory effects, grading, drive and crush, and vegetation would result in loss of nesting habitat and reduced foraging area resulting in displacement of birds.	**Less compared to Proposed Action.** Reducing loss of nesting habitat and foraging area would reduce the displacement of birds.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.

Effects	Proposed Action	Alternative 1	No Action Alternative
Threatened and endangered species			
Mojave desert tortoise	Loss of 2,469 acres of habitat from fencing of the site and translocating desert tortoise. Loss of vegetation will impact long-term viability of site to provide habitat to the desert tortoise.	**Same as the Proposed Action.** Loss of 2,469 acres of habitat from fencing of the site and translocating desert tortoise. Loss of vegetation will be reduced compared with Proposed Action and may provide improved long-term viability of the site to provide habitat to the desert tortoise.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Yuma Ridgway's Rail and Southwestern Willow Flycatcher	May impact migrating individuals through mortality due to collision or electrocution.	**Same as the Proposed Action.** Alternative 1 would include the same infrastructure which could result in mortality for migrating individuals.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Soils			
Increased erosion, loss of topsoil, impacts to sensitive soils	Surface disturbances and removal of vegetation during construction would increase the potential for soil erosion. This would occur on 649 acres due to grading and 1,301 acres from drive and crush. Potential adverse effects would be minimized with implementation of the SWPPP or equivalent during construction and through mitigation, including erosion stabilization, during operation. Grading for site preparation could result in loss of topsoil, desert pavement, and biocrusts, and would be minimized through Project BMPs, including topsoil and biocrust salvage.	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation would reduce erosion and loss of topsoil, desert pavement, and biological soil crusts. Surface disturbance and removal of vegetation would occur on 406 acres due to grading and 617 acres due to drive and crush. An estimated 926 acres would be minimally compacted during construction through overland travel and would have temporary impacts to soils.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Vegetation and noxious weeds			
Native vegetation communities and plants	Approximately 649 acres of previously undisturbed native	**Less compared to the Proposed Action.**	**Less compared to Proposed Action and**

Effects	Proposed Action	Alternative 1	No Action Alternative
	vegetation would be permanently removed by the Proposed Action due to grading. Approximately 1,301 acres would be developed using the drive and crush method where vegetation is scraped off soil surface, crushed, and/or trimmed; seedbank remains in place, albeit buried or compacted. Both grading and drive and crush results in a permanent loss of cacti and yucca.	Minimizes loss of vegetation. Surface disturbance and removal of vegetation would occur on 406 acres due to grading and 617 acres due to drive and crush. An estimated 926 acres would use overland travel techniques which would have temporary impacts on vegetation because if it is crushed, it is expected to recover, and the seedbank is left in place. Cacti and yucca within direct equipment travel paths are impacted and are trimmed to avoid interference with solar panels but some survive.	**Alternative 1.** No change from existing conditions.
Noxious weeds	Vegetation removal and use of construction equipment and vehicles would facilitate the spread of invasive weeds. The Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan would treat against invasive species, but weeds may persist, resulting in an adverse impact to habitat and wildlife.	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation in solar panel arrays would reduce the opportunity for spreading and new invasions of noxious weeds.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.
Water Resources			
Surface waters	Grading, soil compaction, and removal of vegetation can alter natural drainage patterns by changing percolation rates and topography of the site. Lack of vegetative cover can also result in an increase in soil erosion and sedimentation as loose soil particles and sands are more easily transported off site via stormwater runoff. Both grading and drive and crush techniques would result in adverse effects to surface waters, but stormwater protection methods and best	**Less compared to the Proposed Action.** Minimizing soil disturbance and retention of existing vegetation would reduce the potential for soil erosion and flooding.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions.

Effects	Proposed Action	Alternative 1	No Action Alternative
	management practices would reduce the effect.		
Groundwater	The Project would require use of 800 acre-feet during construction from an overallocated basin and could result in adverse effects to the groundwater basin and other uses of groundwater including nearby wells and groundwater-dependent springs or vegetation. The Applicant has secured a Water Supply Agreement that obligates the Project to purchase and relinquish water rights to offset the construction water use over the life of the project making the long-term effects neutral.	**Same as the Proposed Action.** Alternative 1 would require 10 percent less water than the Proposed Action, or 720 acres which could result in adverse effects to the groundwater basin. The Applicant has secured a Water Supply Agreement that obligates the Project to purchase and relinquish water rights to offset the construction water use over the life of the project making the long-term effects neutral.	**Less compared to Proposed Action and Alternative 1.** No change from existing conditions. No long term retirement of water allocations.
Visual Resources			
RMPA	An RMPA from VRM class III to VRM class IV would allow for new major landscape modifications to be authorized that would potentially attract the attention of the casual viewers on 9,960 acres of BLM administered lands.	**Same as Proposed Action.** Alternative 1 would include the same RMPA from VRM class III to VRM class IV.	**Less compared to the Proposed Action and Alternative 1.** No change from existing conditions.

2.6 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. The identification of a preferred alternative does not constitute a commitment or decision in principle by the BLM, and there is no requirement for the BLM to select the preferred alternative in the Record of Decision. 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(d)), the BLM has identified Alternative 1, the Resources Integration Alternative, as the preferred alternative.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

3.1 Introduction

3.1.1 Affected Environment

This chapter describes the existing conditions of the physical, biological, cultural, socioeconomic, and other resources that could be affected by activities related to the Proposed Action and alternatives described in Chapter 2: Proposed Action and Alternatives. The affected environment for the purposes of the NEPA analysis is the Project site, including areas that encompass all ancillary facilities (e.g., access roads, gen-tie line). An analysis area and geographic extent is defined for each resource topic cumulative analysis. Resources addressed include those that occur within, are adjacent, or are associated with the Project under the Proposed Action and alternative analysis area. Select resource analyses also refer to a *study area* that comprises specific areas surveyed. The existing conditions of the affected environment constitute the baseline from which alterations to the environment, referred to as *impacts* or *effects*, are assessed.

A breakout of the various landownerships within the BLM SNDO are found below in Table 3.1-1. Total acres for the SNDO area, including all land ownerships within the area, totals approximately 9,890,365 acres.

Table 3.1-1 Ownership Acres Across Southern Nevada District

Ownership	Acres (% total)
BLM	3,364,520 (34%)
BIA	80,692 (1%)
USFS	317,469 (3%)
USFWS	810,227 (8%)
NPS	695,076 (7%)
DoD	2,977,118 (30%)
DOE	872,561 (9%)
State	52,475 (1%)
County	59,671 (1%)
Private	613,535 (6%)
Total	9,890,365 acres

3.1.2 Environmental Effects

This chapter also presents a summary of the environmental effects and irreversible and irretrievable commitments of resources of the Proposed Action and alternatives. The terms *effect* and *impact* are synonymous in NEPA documents. Refer to 40 CFR § 1508.1(g) for definitions of *direct effect* and *indirect effect* and 40 CFR § 1501.3(b) for how Federal agencies determine the significance of those effects. Irreversible and irretrievable commitments of resources refer to impacts on or loss of resources that cannot be reversed or recovered, respectively. Refer to 40 CFR § 1502.16 for how irreversible and irretrievable commitments of resources are analyzed as part of the Environmental Consequences subsection for each resource topic section.

Because the Proposed Action and alternatives are within a Solar PEIS variance area, the Project is subject to the Solar PEIS PDFs that would potentially reduce or mitigate the effects of the Project. Solar PEIS Programmatic Design Features (PDFs) are presented in each Section under the heading "Project Design Features and Mitigation Measures" first with "PEIS" followed by the acronym for the applicable resource topic used in the Solar PEIS. The Project is also subject to Southern Nevada District Office (SNDO)-required Project Design Features. Residual effects after application of all relevant project management plans, Solar PEIS PDFs, SNDO-required PDFs, and mitigation measures, are discussed at the end of each environmental effects analysis. The environmental effects analysis focuses on those direct and indirect effects on a specific resource in context to the analysis area for the Project. Figure 3.2-3 shows the geographic extent by resource topic of the cumulative effects analysis. All Figures are included Appendix D. Environmental effects analysis for the RMPA considers those effects within the Planning Area, which is the BLM SNDO (approximately 9,890,365 acres) and the VRM Class areas designated under the 1998 Las Vegas RMP, with all designated VRM Classes totaling approximately 3,297,016 acres.

3.1.3 Relevant Required Project Management Plans, Project Design Features, and Project Mitigation Measures Identified in the Analysis

Project management plans to address specific resources shall be required as part of the ROW grant, if authorized by the BLM, that regulate various processes of Project construction, operation and maintenance, and decommissioning. The relevant project management plans have been identified and incorporated into the appropriate sections of this RMPA/EIS analysis. The following management plans are available for public review at the publication of the Final EIS.

- Rough Hat Clark Dust Control and Air Quality Plan
- Rough Hat Clark Fencing Plans
- Rough Hat Clark Lighting Management Plan
- Rough Hat Clark Post-construction Bird and Bat Monitoring and Adaptive Management Plan
- Rough Hat Clark Bird and Bat Conservation Strategy
- Rough Hat Clark Restoration and Decommissioning Plan
- Rough Hat Clark Weed Management Plan

The Rough Hat Clark Cultural Resource Management Plan for Unanticipated Discoveries has been drafted but is confidential.

The Project is subject to the relevant Solar PEIS PDFs and SNDO-required PDFs, which are specified, as appropriate, in each resource section. Additionally, mitigation measures are proposed, where applicable, based on potential for adverse effects from the Project. Each mitigation measure is assigned an alphanumeric code using "MM" followed by an abbreviation for the applicable resource topic and sequential numeral; for example, "MMAir-1" is the first in a series of mitigation measures to address an air quality impact. *Mitigation measures* are actions taken to avoid, minimize, or compensate for (in limited circumstances only) potential environmental impacts. Mitigation measures are designed to be achievable, effective, and durable in accordance with CEQ regulations (40 CFR § 1508.20).

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

3.1.4 Cumulative Effects

The cumulative effects analysis addresses the potential for cumulative impacts in the vicinity of the Project in Clark County, Nevada, and Nye County, Nevada, as well as Inyo County, California, and San Bernardino County, California and vary by resource topic. The CEQ regulations for implementing NEPA define *cumulative effects* as environmental effects resulting from the incremental effects of an action when added to other past, present, and reasonably foreseeable future actions regardless of the agency (federal or non-federal) or person undertaking such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.1(g)(3)). The NEPA cumulative effects analysis is accomplished through the following steps:

- Establish the geographic and temporal scope for analysis.
- Identify the affected environment, including resources, ecosystems, and human communities, their baseline conditions, and current stresses in relation to regulatory thresholds.
- Identify past, present, and reasonably foreseeable future actions within the geographic and temporal scope and their impacts to resources.
- Determine the incremental environmental effects of the project combined with past, present, and reasonably foreseeable future actions and provide a discussion of the magnitude and significance of each.

3.2 Geographic Extent, Analysis Area, and Timeframe for Cumulative Effects Analysis

The cumulative geographic extent and cumulative effects analysis area for potentially affected resource topics evaluated near the Project site is provided in Table 3.2-1. The geographic extent and analysis area 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 impacts than soils. The *geographic extent* for each resource topic identified the discrete area where cumulative projects are concentrated and proximate to the Project site such that the cumulative analysis is meaningful and location specific. The *cumulative effects analysis area* for each resource topic considers the potential extent within which cumulative effects from the Project in combination with the cumulative projects could occur.

The cumulative geographic extent differs from the cumulative effects analysis area for the following resources: threatened and endangered species, environmental justice, socioeconomics, and aviation. For example, the cumulative effects analysis area for threatened and endangered species includes the Eastern Mojave Recovery Unit for the Mojave desert tortoise in addition to the Pahrump Valley because the Project in combination with cumulative projects could result in cumulative effects within this larger analysis area; however, the geographic extent is confined to the cumulative projects in the Pahrump Valley as these are the projects that could contribute a combined effect with the Project due to adjacency and similar resources present and around these projects.

The cumulative geographic extents for each resource topic are shown in Figure 3.2-3. Climate change and aviation geographic extents were not included due to the geographic extents of global and within a 50-mile radius, respectively. Figures of the cumulative effects analysis areas for individual resource topics are included. The cumulative effects analysis for the VRM RMPA considers those effects within the VRM Planning Area, which is the BLM Southern Nevada District Office and the VRM Class areas designated under the 1998 Las Vegas RMP. For context, the BLM, United States Fish and Wildlife Service (USFWS), United States Forest Service (USFS), and the National Park Service (NPS) administer approximately 93 percent of the land around the Project site within 34 miles (the furthest distance of a cumulative project boundary).

The timeframe of the cumulative impacts analysis includes activities that are ongoing and would occur up to 30 years in the future (the general timeframe for the lifespan of the Project) immediately followed by post-Project reclamation, which is expected to last decades. Little or no information is available for projects that could occur farther than 5 to 10 years in the future. Accordingly, projects that have not been proposed or planned or that have not entered the NEPA review process are not considered in the cumulative analysis. Past and present projects are only included if the Proposed Action or action alternatives would contribute to their current aggregate effects.

Past, Present, and Reasonably Foreseeable Future Actions

The scope for cumulative effects analysis includes, but is not limited to, 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:

- Environmental review documents are in preparation or finalized.

- Currently in a detailed design or planning phase.
- Approved but not yet under construction (i.e., ROD published and/or construction funded)
- Approved and under construction.
- Constructed and in active operation.
- Completed or closed.
- In the bidding or research phase that are reasonably likely to be proposed.

The actions described in Table 3.2-1 and shown in Figures 3.2-1 and 3.2-2, in Appendix D, are those that are ongoing or reasonably foreseeable and could result in cumulative impacts.

Within the Nevada portion of the Pahrump Valley, there are seven solar projects proposed in close proximity to one another. These proposed solar projects in the Pahrump Valley are not connected actions because they are individual proposals that do not meet the definition of "connected action" under 40 CFR 1501.9(e)(1). These projects do not automatically trigger other actions and are not interdependent parts of a larger action. Implementation of one project is not dependent on the other proposed projects. Therefore, the BLM is considering these projects as individual proposals and all of them are included in the cumulative effects analysis.

The cumulative analysis is discussed for the Proposed Action as well as for the action alternative. Table 3.2-2 provides the approximate disturbance acreages under the Proposed Action. The Proposed Action cumulative analysis assumes all renewable energy projects located within the BLM Southern Nevada District Office jurisdiction would be constructed using clear and cut/drive and crush (D-2) and clear and cut with soil removal (D-3) methods.

For comparative purposes, the BLM is analyzing an additional cumulative effects scenario which assumes that, should Alternative 1 (Resources Integration Alternative) be selected for the Project, similar construction techniques will be implemented for all foreseeable cumulative solar projects, see Figure 3.2-1, developed in the Nevada portion of the Pahrump Valley under jurisdiction of the BLM SNDO that have yet to be authorized (i.e., Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea). This includes limiting clear and cut with soil removal (D-3) to 20 percent of the development area and incorporating overland travel (D-1) such that 60 percent of the vegetation density onsite will be retained.

Table 3.2-3 provides acreage amounts for each development method, including avoidance (D-0) and overland travel (D-1) areas for each cumulative project analyzed. This additional cumulative effects analysis does not assume similar construction techniques for projects in California as these projects are under different jurisdiction and therefore governed by a different management plan from the Nevada BLM projects. Therefore, the additional cumulative effects analysis assumes the acreages shown for D-2 and D-3 for projects on BLM lands in the Nevada portion of the Pahrump Valley only. These acreages were derived for each cumulative project by calculating 20 percent of the total proposed development acreages for clear and cut with soil removal (D-3) and 60 percent for vegetation retention through D-1, as described in the individual project's most up-to-date Plan of Development.

The assumed figures for vegetation-disturbance used for the additional cumulative effects analysis do not reflect any actual development decisions, nor do they comprise all reasonably foreseeable future projects within the analysis area. The additional analysis was developed only for the purpose of meeting the decision-makers' needs in making a reasoned choice between alternatives for the Project, specifically.

Table 3.2-1 Geographic Extent and Cumulative Effects Analysis Area of the Cumulative Projects Considered in Analysis by Resource Topic

Resource topic	Geographic extent	Analysis Area	Explanation
Paleontological resources	PFYC Class 3 (moderate or unknown), Class 3a (moderate), Class 3b (unknown) and Class 4 (high) within the Pahrump Valley	Same as the geographic extent	Resources within this area are more likely to originate from the same timeframe based on geologic formations or history.
Public health and safety	Project site plus 1-mile radius and the extent of SR 160 from US 95 to Las Vegas	Same as geographic extent	Projects that are located nearby, utilize the same roadways during the Project lifespan, and/or utilize the same evacuation routes in the event of an emergency, could contribute to the same cumulative effects.
Transportation and traffic	Project site and 5-mile radius, with a focus on SR 160 (e.g., intersections with Frontage Road, Carpenter Canyon Road, Trout Canyon Road, Tecopa Road)	Same as geographic extent	Projects that use the same roadways would have the potential to contribute to cumulative effects.
Visual resources; recreation; native American concerns	Within 15-mile radius of Project site	Same as geographic extent	Projects within this radius could contribute adverse impacts on the same types of visual, recreation, or tribal cultural resources. Resources within this distance are more likely to originate from the same ethnographic group based on history.
Cultural resources	Within a 5-mile radius of the Project site	Same as geographic extent	Projects within this radius could contribute to adverse cultural resources or historic properties cumulative effects including physical, visual, auditory, and atmospheric.
Air quality	Pahrump Valley Hydrographic Basin (10-162)	Same as geographic extent	In Nevada, hydrographic basins are used to define airsheds. Projects within the Pahrump Valley Hydrographic Basin could contribute to adverse cumulative effects within the airshed.

Resource topic	Geographic extent	Analysis Area	Explanation
Water resources (including jurisdictional waters)	Pahrump Valley Hydrographic Basin (10-162) for groundwater; HUC-10 watersheds in Pahrump Valley for surface waters (i.e., Town of Pahrump, Wheeler Wash, Pahrump Valley, Calvada Springs, Lovell Wash, Stewart Valley)	Same as geographic extent	Impacts from other projects within the same connected groundwater system (i.e., hydrographic basin) and the same areas of surface-water hydrologic connectivity could accumulate.
Soils	HUC-10 Watersheds in Pahrump Valley (i.e., Town of Pahrump, Wheeler Wash, Pahrump Valley, Calvada Springs, Lovell Wash, Stewart Valley)	Same as geographic extent	Soil destabilization and erosion from other projects in the same areas of surface-water hydrologic connectivity could occur downstream.
Vegetation, special status plants, and noxious weeds; wildlife, migratory birds, and other special status wildlife; threatened and endangered species	Pahrump Valley	Pahrump Valley as well as areas within the Eastern Mojave Recovery Unit for Mojave desert tortoise (refer to Section 3.4: Threatened and Endangered Species for figure of analysis area)	Other projects or management actions within this area would be expected to affect similar vegetation and habitat and, therefore, wildlife. This area generally accounts for the area within which a similar population of a species or habitat could occur. Cumulative projects or actions within the region or same recovery unit would affect habitat necessary to conserve the genetic, behavioral, morphological, and ecological diversity necessary for long-term sustainability of species.
Land use and realty; socioeconomics; environmental justice	Pahrump Valley	Within a 55 mile-radius of Project site and census tracts within a 6 mile-radius of Project site and along SR 160 for environmental justice (refer to Section 3.7: Environmental Justice for figure of analysis area); Nye and Clark counties, Nevada for socioeconomics; Pahrump Valley for land use and realty	Impacts to these resources tend to overlap regionally and could result in cumulative impacts to communities, residents, and visitors.
Climate Change	Global	Global	Climate change is a global phenomenon.

Resource topic	**Geographic extent**	Analysis Area	**Explanation**
Aviation (analyzed in visual resources, and land use and realty)	Pahrump Valley	An approximately 50-mile radius around the Project site (refer to Section 3.8: Land Use and Realty and Section 3.16: Visual Resources for figures of analysis areas)	Projects within this radius could contribute to adverse impacts on the same aviation facilities.

Note: Pahrump Valley is defined as aligning with the Pahrump Valley Hydrographic Basin for cumulative analysis purposes.

Table 3.2-2 Cumulative Renewable Projects Approximate Disturbance Acreages under the Proposed Action Scenario

Cumulative project	State location/ ownership	D-0	D-1	D-2	D-3	Total
Copper Rays	NV/BLM	188	120	0	4,106	4,414 [1]
Rough Hat Clark	NV/BLM	519	0	1,301	649	2,469
Purple Sage	NV/BLM	2,913	429	288	792	4,424
Mosey	NV/BLM	0	0	0	3,471	3,471
Larrea	NV/BLM	0	0	0	1,055	1,055
Yellow Pine	NV/BLM	23	0	2,364	600	2,987
Canyon Mesa	NV/private	0	0	131	35	166
Borderline Solar	CA/BLM	0	0	0	6,800	6,800
Sun Baked	CA/BLM	0	0	0	2,881	2,881
Bonanza Peak	CA/private	0	0	0	2,800	2,800
Total[2]		**3,643**	**549**	**4,084**	**23,189**	**31,465**

Notes:

1. The disturbance total for the Copper Rays Solar Project includes the permanent ROW area as well as the temporary gen-tie work areas outside of the permanent ROW.
2. Numbers may not total due to rounding.

Table 3.2-3 Cumulative Renewable Projects Approximate Disturbance Acreages under the Alternative 1 Scenario

Cumulative project	State location/ ownership	D-0	D-1	D-2	D-3	Total
Copper Rays	NV/BLM	748[3]	1,753	1,169	696	4,366 [1,2]
Rough Hat Clark	NV/BLM	520	926	617	406	2,469
Purple Sage	NV/BLM	2,913	429	288	792	4,424
Mosey	NV/BLM	0	1,666	1,111	694	3,471
Larrea	NV/BLM	0	506	338	211	1,055
Yellow Pine	NV/BLM	23	0	2,364	600	2,987
Canyon Mesa	NV/private	0	0	131	35	166
Borderline Solar	CA/BLM	0	0	0	6,800	6,800
Sun Baked	CA/BLM	0	0	0	2,881	2,881
Bonanza Peak	CA/private	0	0	0	2,800	2,800
Total[3]		**4,204**	**5,280**	**6,017**	**15,915**	**31,417**

Notes:

1. The disturbance total for the Copper Rays Solar Project includes the permanent ROW area as well as the temporary gen-tie work areas outside of the permanent ROW.
2. The Copper Rays Solar Project Alternative 1 avoidance area acreage includes a corridor for an OHV route that is excluded from development.
3. Numbers may not total due to rounding.

Table 3.2-4 Past, Present, and Reasonably Foreseeable Future Actions within the Cumulative Effects Analysis Area

#	BLM Serial number and project name	Project type	Approximate size	County	Status	Construction method	Construction duration	Start of construction	End of construction
1	NVN-89655: Copper Rays Solar (700 MW and integrated battery storage) Utility Corridor RMPA	Energy	Phase I: 1,350 acres Phase II: 2,881 acres Gen-tie: 175 acres (5 miles) Access: 2.1 acres Utility Corridor RMPA: 38-mile rerouted segment	Nye	Proposed	Grading/ drive and crush	Phase I: 21 months Phase II: 33 months	Phase I: January 2026 Phase II: January 2028	Phase I: June 2027 Phase II: December 2029
2	NVN-10022: Purple Sage (Golden Currant) Solar (400 MW and integrated battery storage) Utility Corridor RMPA	Energy	4,424 acres; Gen-tie: 27 acres (2.3 miles) Utility Corridor RMPA: 38-mile rerouted segment	Clark	Proposed	Grading/drive and crush	12 months	October 2025	March 2027
3	NVN-90788: Yellow Pine Solar (500 MW and integrated battery storage)	Energy	Phase I: 2,261 acres Phase II (subarea D): 738 acres; Gen-tie: 0.1 mile	Clark	Construction	Mow/drive and crush	Phase I: 24 months	Phase I: December 2021 Phase II (subarea D): TBD	Phase I: December 2023 Phase II (subarea D): TBD

#	BLM Serial number and project name	Project type	Approximate size	County	Status	Construction method	Construction duration	Start of construction	End of construction
4	N-092514/ N-94686: Advanced Rail Energy Storage (ARES) Energy Storage Project (50 MW)	Energy	72 acres	Clark; Nye	Approved	Grading/cut and fill	6 to 9 months	October 2020	2021
5	NVN-101055: Mosey Solar (500 MW with integrated battery storage)	Energy	3,471 acres Gen-tie: 8 acres (3.3 miles)	Clark	Proposed	Traditional (disk and roll)	24 months	January 2027	December 2028
6	Frontera Solar (700 MW and integrated battery storage)	Energy	4,270 acres	Inyo; San Bernardino	Proposed	Traditional (disc and roll)	32 months	TBD	TBD
7	Southwest Nevada Reliability Improvement Project	Transmission	42 miles	TBD	Construction	TBD	TBD	Spring 2023	TBD
8	Pahrump Valley Loop-in Project[1]	Transmission	9.6 miles	Nye	Paused	TBD	TBD	Fall 2022	TBD
9	SR 160 and SR 159 Corridor Improvements	Roadway	TBD	Clark	Proposed; study underway	TBD	TBD	TBD	TBD

#	BLM Serial number and project name	Project type	Approximate size	County	Status	Construction method	Construction duration	Start of construction	End of construction
10	SR 160 Phase 2 Widening (Blue Diamond Rehabilitation)	Roadway	TBD	Clark; Nye	Completed	TBD	23 Months	September 2018	August 2020
11	Mount Charleston Wilderness Management Plan	Land management	56,598 acres	Clark	Proposed; scoping period March 2022	N/A	N/A	N/A	N/A
12	Spring Mountains Wild Horse and Burro Complex Project	Land management	784,326 acres	Clark; Nye	Approved; underway	N/A	N/A	N/A	N/A
13	Charleston View Community Plan (no projects are proposed currently)	Land management	43,440 acres	Inyo	Proposed; draft plan completed 2018	N/A	N/A	N/A	N/A
14	SR 160 Pahrump Bypass	Roadway	TBD	Nye	Proposed	N/A	TBD	TBD	TBD
15	Borderline Solar (600 MW and integrated battery storage)	Energy	6,800 acres Gen-tie: 10.5 miles	Inyo; Clark	Proposed	TBD	20 months	April 2026	December 2027

#	BLM Serial number and project name	Project type	Approximate size	County	Status	Construction method	Construction duration	Start of construction	End of construction
16	Sun Baked Solar Project (400 MW and integrated battery storage)	Energy	2,881 acres Gen-tie: 15 miles	Inyo	Proposed	Traditional (disc and roll)	32 months	TBD	TBD
17	Bonanza Peak Solar Project (and integrated battery storage)	Energy	2,800 acres	Inyo	Proposed	TBD	TBD	TBD	TBD
18	Bonanza Peak Transmission Project	Energy	154.1 acres	Inyo; Clark; Nye	Proposed	TBD	TBD	TBD	TBD
19	Larrea Solar (205 MW and integrated battery storage)	Energy	1,055 acres; Gen-tie: 2.7 miles	Clark	Proposed	Mowing	12 to 18 months	January 2026	January 2027
20	Prairie Fire Training Facility	Recreation	550 acres	Nye	Proposed	TBD	TBD	TBD	TBD
21	Gridliance West Core Upgrades Transmission	Energy	16.8 miles of new line; 110.1 miles of removed line	Clark; Nye	Proposed	TBD	TBD	TBD	December 2025
22	Canyon Mesa Solar (18 MW and integrated battery storage on private lands)	Energy	166 acres	Nye	Approved; underway	Mowing/drive and crush	10 months	Fall 2023	Fall/Summer 2024

#	BLM Serial number and project name	Project type	Approximate size	County	Status	Construction method	Construction duration	Start of construction	End of construction
23	Pahrump Community Pit[1]	Minerals	2,740 acres	Nye	Authorized/ Active	N/A	Active	N/A	N/A
24	NDOT Mineral Materials Pit (CL 47-04 Tecopa Road Pit)[1]	Minerals	39.5 acres	Clark	Authorized/ Active	N/A	Active	N/A	N/A
	NVN-99407: Rough Hat Nye Solar (500 MW with integrated battery storage)	*Energy*	*3,400 acres*	*Nye*	*Withdrawn*	*Drive and crush*	*N/A*	*N/A*	*N/A*

Notes:

TBD: Detailed project information unknown and not accessible.

N/A: A program, project, or plan that does not involve construction and is not associated with a construction period.

1. Project not shown in Figure 3.2-3 because location data is unknown and not accessible.

3.3 Air Quality

3.3.1 Introduction

This section describes air quality conditions that occur within the Project's analysis area. The *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* was prepared for the Proposed Action, which includes supplemental information on the regulatory background, existing setting, methodology, and analysis results of air quality impacts for the Project. The Project is subject to several laws and regulations, including the federal Clean Air Act (CAA) and section 94 of the Clark County Air Quality Regulations. The laws and regulations that apply to the Project are described in Appendix C.

3.3.2 Analysis Area

Air quality is a regional resource and is neither defined nor limited by jurisdictional boundaries or project boundaries. The study area for the air quality analysis encompasses the hydrographic basin[1] in which the Project site is located (Pahrump Valley 162; refer to Figure 3.3-1 in Appendix D), within Clark County, under the jurisdiction of the Nevada Department of Environmental Protection (NDEP) Clark County Division of Air Quality (DAQ).

3.3.3 Affected Environment

Air Standards

The United States Environmental Protection Agency (USEPA) has set air pollutant emission standards, referred to as National Ambient Air Quality Standards (NAAQS), to protect public health and the environment. The Proposed Action is subject to NAAQS. The State of Nevada has adopted federal rules by reference and established state ambient air quality standards (SAAQS) with some exceptions (Nevada Administrative Code [NAC] § 445B.22097). Table 3.3-1 lists the state and national ambient air quality standards for certain criteria air pollutants.

Table 3.3-1 Nevada and National Ambient Air Quality Standards for Criteria Air Pollutants

Pollutant	Averaging time	Nevada SAAQS	NAAQS Primary	NAAQS Secondary
Ozone (O_3)	8 hours	0.070 ppm	0.070 ppm (137 µg/m^3)	0.070 ppm (137 µg/m^3)
	1 hour [a]	0.10 ppm (195 µg/m^3)	–	–

[1] As hydrographic basins are based upon topography, basins are also typically used to define local airsheds throughout Nevada.

Pollutant	Averaging time	Nevada SAAQS	NAAQS Primary	NAAQS Secondary
Carbon monoxide (CO)	1 hour [b]	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	–
	8 hours [c]	9 ppm (10,500 µg /m^3)		
Nitrogen dioxide (NO_2)	1 hour	100 ppb (188 µg/m^3)	100 ppb (188 µg/m^3)	–
	AAM (1 year)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)
Sulfur dioxide (SO_2)	1 hour	75 ppb (196 µg/m^3)	75 ppb (196 µg/m^3)	–
	3 hours	0.5 ppm (1,300 µg/m^3)	–	0.5 ppm (1,300 µg/m^3)
	24 hours	0.14 ppm (365 µg/m^3)	0.14 ppm (365 µg/m^3)	–
	AAM	0.030 ppm (80 µg/m^3)	0.030 ppm (81 µg/m^3)	–
Lead (Pb)	Calendar quarter	–	1.5 µg/m^3	1.5 µg/m^3
	Rolling 3-month average [d]	0.15 µg/m^3	0.15 µg/m^3	0.15 µg/m^3
Particulate pollution: PM_{10}	24 hours	150 µg/m^3	150 µg/m^3	150 µg/m^3
	AAM	50 µg/m^3	50 µg/m^3	50 µg/m^3
Particulate pollution: $PM_{2.5}$	24 hours	35 µg/m^3	35 µg/m^3	35 µg/m^3
	AAM	12.0 µg/m^3	12.0 µg/m^3	15 µg/m^3
Hydrogen sulfide (H_2S)	1 hour	0.08 ppm (112 µg/m^3)	–	–

mg/m^3: milligrams per cubic meter

µg/m^3: micrograms per cubic meter ppm: parts per million

AAM: annual arithmetic Mean ppb: parts per billion

Notes:

a. For the Lake Tahoe Basin, #90.

b. For any elevation.

c. For areas less than 5,000 feet (1,524 meters) above mean sea level.

d. Applies to areas of nonattainment; however, there are no lead nonattainment areas in Nevada.

Source: (State of Nevada 2020; USEPA 2020; (RCH Group, 2023))

Air Quality Designations

The hydrographic basin within which the Project site is located is in attainment for all criteria pollutants. However, portions of Clark County (Nevada) and Inyo County (California) have been designated as nonattainment and maintenance areas. The portion of Clark County that is designated as a nonattainment area for ozone and maintenance area for PM_{10} is hydrographic basin 212, which is approximately 15 miles east of the Project site, encompassing the greater Las Vegas Valley (airshed) inclusive of Nevada's largest population center. Hydrographic basin 212 is a marginal nonattainment area for the 2015 O_3 NAAQS and an attainment area subject to a maintenance plan for the CO and PM_{10} NAAQS. The closest nonattainment area for PM_{10} in Inyo County, California, is located approximately 20 miles south of the Project site.

Although the Project is in Clark County, the Project is located within the Pahrump Valley which spans both Clark and Nye counties. The NDEP Bureau of Air Quality Planning began monitoring for PM_{10} in the Town of Pahrump, in Nye County, in January 2001. Twenty-seven exceedances of the 24-hour NAAQS were recorded during 2001, 2002 and 2003. Under the federal CAA, this meant that Pahrump was not attaining the federal PM_{10} 24-hour standard of 150 $\mu g/m^3$. Disturbed vacant lands and unpaved roads were determined to be the main contributors, accounting for 92 percent of PM_{10} emissions in the Pahrump Valley (USEPA, 2022b).

The USEPA agreed to allow the NDEP Bureau of Air Quality Planning and Nye County the opportunity to address the problem through a Memorandum of Understanding (MOU). The actions taken include limiting vehicle access, watering, re-vegetation, dust control plans and more, to bring the area into compliance with the NAAQS. As part of the effort to define PM_{10} impacts within the Pahrump Valley, the NDEP also developed the Clean Air Action Plan to Attain Federal Standards for PM_{10} to achieve compliance with the 24-hour NAAQS (NDEP, 2006). Due to this effort, the Pahrump Valley achieved and continues to achieve attainment with the NAAQS.

The EPA approved the Clark County Department of Environment and Sustainability (DES) portion of the Nevada State Implementation Plan (SIP) in May 2022 (Clark County Department of Environment and Sustainability, 2022). The updated SIP includes updates to the following rules: Fugitive Dust from Open Areas and Vacant Lots, Fugitive Dust from Paved Roads and Street Sweeping Equipment, and Permitting and Dust Control for Construction Activities. The SIP updates comply with the relevant CAA requirements. The Proposed Action would comply with the latest version of the SIP.

3.3.4 Environmental Consequences

Methodology

This section describes the potential impacts to air quality associated with the construction, operation, and maintenance of the solar facility, transmission lines, and substation. Expected emissions (as well as hazardous air pollutant [HAP] emissions) generated during Project construction were calculated based on the detailed list of equipment and the schedule provided by the Applicant. Section 176(c) of the CAA prohibits the BLM from taking an action in a nonattainment/maintenance area unless the emissions from the action conform to the SIP for the area. The USEPA promulgated the General Conformity Rule to evaluate emissions from projects that are not highway or transit related. Under this rule, a General Conformity Determination is not required if levels of the pollutants (or pollutant precursors) for which an area is designated nonattainment/maintenance are below de minimis levels, i.e., levels at which it can be presumed there would be no impact to air quality. If a project is in an attainment area, as is the case with the Project, the General Conformity Rule does not apply.

Dispersion of the air emissions generated during construction was modeled based on NAAQS and SAAQS standards to determine the maximum concentrations of criteria pollutants at receptor locations near the Project site. Concentrations of pollutants were also modeled for the nearby, Death Valley National Park in California, which is located 30 miles from the Project site. Receptor locations represent locations that a person could feasibly be during construction, including at the fence line of the Project site and adjacent the gen-tie lines. Refer to the *Rough Hat Clark County Solar Project Air Quality and Climate Change Technical Report* for detailed methodology, assumptions, and additional information.

Emissions calculations for the Project were subdivided into construction-related emissions (those emissions that are expected to be temporary in nature) and operational-related emissions (those emissions that are expected to occur throughout the operational lifetime of the Project). Construction-related emissions include the following:

- Exhaust from on- and off-road construction vehicles and equipment
- Exhaust from on-road construction worker commuter vehicles
- Exhaust from on-road construction material and equipment delivery vehicles
- Fugitive dust from vehicle travel on paved and unpaved roads
- Fugitive dust from earthmoving and general construction activities

Air quality calculations were made for combustion sources such as on-road vehicles from employees, haul trucks, and pumps/generators as well as on-site combustion equipment such as loaders and excavators. Fugitive dust emissions from grading, loading/unloading, and vehicle movement on unpaved surfaces were also calculated. Emissions were determined for USEPA criteria pollutants such as CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ as well as volatile organic compounds (VOC), which are a precursor to the formation of ozone (O_3), which is also a criteria pollutant. See the *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* for more details regarding the emission calculations.

Regulatory models used to estimate air quality impacts include the following:

- USEPA's Motor Vehicle Emissions Simulator (MOVES) emissions inventory model (USEPA 2021a)
- USEPA NONROAD (Nonroad Engines, Equipment, and Vehicles Model) emissions inventory model (USEPA 2009)

- USEPA's AP 42 Compilation of Air Pollutant Emission Factors
- AERMOD (USEPA 2018b; USEPA 2005b; USEPA 2017c)

In addition to criteria air pollutants, the *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* evaluated HAP emissions such as acetaldehyde, formaldehyde, benzene, toluene, and xylene. HAPs are gaseous organic and inorganic chemicals and PM that the USEPA has identified to have known or suspected potential to cause cancer or other serious health effects. HAPs are emitted by a wide range of sources, including construction equipment and industrial facilities. The CAA mandates that the USEPA regulate HAP emissions. While there are currently no ambient (i.e., outdoor) standards for HAP emission levels, standards do exist for the level of HAP emissions emitted by stationary sources. HAP emissions are calculated based on speciation factors, which are essentially the percentage of an individual HAP within the total VOC emissions from construction equipment and vehicles.

Proposed Action

Construction Impacts

Construction activities would result in air pollutant emissions from equipment exhaust during construction, vehicle exhaust caused by travel to and from the Project site, and fugitive dust from ground disturbance. Vehicle and equipment operation during construction would emit particulate matter and other criteria air pollutants. Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM_{10} and $PM_{2.5}$. Construction activities, including grading and driving on unpaved roadways, would be sources of fugitive dust. Table 3.3-2 presents the estimated annual emissions for all construction-related emissions (including combustion and fugitive dust emissions) for the Proposed Action without combustion and fugitive dust controls. The emissions associated with the first year (2024) of construction are estimated to be larger than the emissions associated with the last year (2025) of construction.

Table 3.3-2 Annual Construction Emissions (tons) without Controls

Construction Year	VOC	CO	NO_2	SO_2	PM_{10}	$PM_{2.5}$
2024	3.21	10.7	11.6	0.14	66.4	9.75
2025	2.48	10.6	9.24	0.11	44.2	11.3

Table 3.3-3 presents the maximum CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ concentrations for the Proposed Action without combustion and fugitive dust controls during 2024 and 2025. The maximum concentrations include the concentrations from the Project, the background concentrations, and the total concentrations. The concentrations during 2024 tend to be higher than during 2025 due to greater amount of site preparation and more equipment usage. The maximum concentrations for PM_{10} would potentially exceed the NAAQS/SAAQS and cause adverse effects without combustion and fugitive dust controls. Therefore, emission controls

would be implemented as described below. No adverse effect on local air quality from CO, NO_2, SO_2 and $PM_{2.5}$ emissions would occur.

Table 3.3-3 Estimated Maximum Concentration without Controls During 2024 and 2025

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 hour**	**8 hour**	**1 hour**	**1 year**	**1 hour**	**3 hour**	**24 hour**	**1 year**	**24 hour**	**1 year**
2024										
Maximum modeled concentration (µg/m^3)	168	24.3	98.9	2.81	2.35	1.18	93.2	18.3	10.5	2.65
Background concentration (µg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total concentration (µg/m^3)	**2,980**	**2,432**	**162**	**9.06**	**13.6**	**11.8**	**172**	**33.6**	**25.4**	**7.30**
NAAQS/SAAQS (µg/m^3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.4	24.3	86.0	9.1	6.9	0.9	114	67.1	72.7	60.9
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	**Yes**	No	No	No
2025										
Maximum modeled concentration (µg/m^3)	66.6	9.66	45.3	1.29	1.71	0.86	54.3	10.6	6.63	1.68
Background concentration (µg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total concentration (µg/m3)	**2,878**	**2,417**	**108**	**7.54**	**12.9**	**11.5**	**133**	**25.9**	**21.6**	**6.33**
NAAQS/SAAQS (µg/m3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.2	24.2	57.4	7.5	6.6	0.9	88.4	51.9	61.7	52.8
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	No	No	No	No

Scraping, grading, and leveling would be limited to Project roads, the substation, operation and maintenance (O&M) facilities, a temporary construction office complex, temporary laydown areas, and some equipment pads (e.g., battery enclosures). Grading would occur on approximately 35 percent of the disturbance area (refer to Section 2.3 Project Construction).

Preparation of a Dust Control and Air Quality Plan (Plan) would be required as part of the BLM ROW grant prior to construction and would be implemented during construction. The Plan would include methods for dust abatement and to reduce wind erosion. The Project is also required to obtain a dust control permit and implement associated best management practices (BMPs) through Clark County DAQ. The permit would be monitored by the Clark County DAQ until the Project becomes operational.

The Project would implement Solar PEIS PDFs AQC1-1 and AQC1-2 as well as mitigation measure (MM) Air-1 to further reduce potential air quality impacts during construction. Solar PEIS PDF AQC1-1 requires project developers to consult with BLM in the early phases of project planning to help determine the potential conformance to air quality and other potential constraints, such as identifying air quality and other related constraints associated with the proposed Project site. The Project has complied with this measure during the NEPA process and through preparation of *Rough Hat Clark County Solar Project Air Quality and Climate Change Technical Report*, which includes analysis results of air quality impacts for the Project. The Project would continue to coordinate with BLM during the implementation and construction phases to ensure effectiveness of identified air quality measures. Solar PEIS PDF AQC1-2 requires projects to identify measures to minimize air quality impacts, such as using equipment that meets or exceeds emission standards specified in the state code of regulations and that meets the applicable USEPA Tier 3 and Tier 4 emissions requirements and preparing a Dust Abatement Plan (included in the Dust Control and Air Quality Plan). As part of the Plan, the Project would comply with fugitive dust control requirements, including but not limited to, applying water in sufficient quantities to prevent the generation of visible dust plumes, applying soil binders to uncovered areas upon BLM approval, reestablishing ground cover as quickly as possible, using a wheel-washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site, and maintaining effective cover over exposed areas. MM Air-1 includes additional measures beyond those identified in the Solar PEIS to reduce emissions, such as the implementation of a carpooling program to minimize construction worker trips to the Project site and establishment of a public access exclusionary zone of 1,500 feet along the Project boundary (excluding SR 160) during construction activities.

Table 3.3-4 presents the estimated annual emissions for all construction-related emissions (including combustion and fugitive dust emissions) for the Proposed Action with combustion and fugitive dust controls.

Table 3.3-4 Annual Construction Emissions (tons) with Design Features and Mitigation Measure

Construction Year	VOC	CO	NO2	SO2	PM10	PM2.5
2024	2.51	21.3	9.36	0.14	20.9	3.44
2025	1.92	19.9	7.27	0.11	11.7	2.87

The maximum CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ concentrations for the Proposed Action with incorporation of the Dust Control and Air Quality Plan, PEIS design features, and mitigation measure are provided in Table 3.3-5. The concentrations include the background concentrations and the total concentrations during 2024 and 2025, respectively. With fugitive dust controls, the maximum PM_{10} would not exceed the NAAQS/SAAQS. Therefore, an adverse effect on local air quality from combustion and fugitive dust emissions would not occur.

Table 3.3-5 Estimated Maximum Concentration with Design Features and Mitigation Measure During 2024 and 2025

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 hour**	**8 hour**	**1 hour**	**1 year**	**1 hour**	**3 hour**	**24 hour**	**1 year**	**24 hour**	**1 year**
2024										
Maximum modeled concentration (μg/m^3)	415	60.2	79.6	2.26	2.35	1.18	28.6	5.60	3.56	0.90
Background concentration (μg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total concentration (μg/m^3)	**3,227**	**2,468**	**142**	**8.51**	**13.6**	**11.8**	**107**	**20.9**	**18.5**	**5.55**
NAAQS/SAAQS (μg/m^3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	8.1	24.7	75.7	8.5	6.9	0.9	71.3	41.8	52.9	46.3
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	No	No	No	No
2025										
Maximum modeled concentration (μg/m^3)	267	38.7	30.1	0.85	1.71	0.86	13.5	2.65	1.60	0.41
Background concentration (μg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 hour**	**8 hour**	**1 hour**	**1 year**	**1 hour**	**3 hour**	**24 hour**	**1 year**	**24 hour**	**1 year**
Total concentration (µg/m3)	**3,079**	**2,446**	**92.8**	**7.11**	**12.9**	**11.5**	**91.8**	**17.9**	**16.6**	**5.06**
NAAQS/SAAQS (µg/m3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.7	24.5	49.4	7.1	6.6	0.9	61.2	35.9	47.3	42.2
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	No	No	No	No

Death Valley National Park

Death Valley National Park is located approximately 30 miles to the west of the Project site. Table 3.3-6 presents the maximum CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ concentrations with combustion and fugitive dust controls at the Death Valley National Park during 2024 and 2025, respectively. The maximum concentrations for all criteria pollutants within the averaging periods are well below the NAAQS/SAAQS. No adverse effect on Death Valley National Park would occur.

Table 3.3-6 Estimated Maximum Concentration at Death Valley National Park with Controls During 2024 and 2025

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 hour**	**8 hour**	**1 hour**	**1 year**	**1 hour**	**3 hour**	**24 hour**	**1 year**	**24 hour**	**1 year**
					2024					
Maximum modeled concentration (µg/m^3)	13.0	1.82	0.77	<0.01	0.10	0.04	0.72	0.01	0.12	<0.01
Background concentration (µg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total concentration (µg/m^3)	**2,825**	**2,409**	**63.5**	**6.26**	**11.3**	**10.7**	**79.0**	**15.3**	**15.1**	**4.65**
NAAQS/SAAQS (µg/m^3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.1	24.1	33.8	6.3	5.8	0.8	52.7	30.6	43.1	38.8
Exceed NAAQS/SAAQS (Yes/No)?	No	No	No	No	No	No	No	No	No	No
Maximum modeled concentration (µg/m^3)	13.0	1.82	0.77	<0.01	0.10	0.04	0.72	0.01	0.12	<0.01

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 hour**	**8 hour**	**1 hour**	**1 year**	**1 hour**	**3 hour**	**24 hour**	**1 year**	**24 hour**	**1 year**
PSD Class I increment (µg/m^3)	-	-	-	2.5	25	-	8	4	2	1
Exceed PSD Class I increment? (Yes/No)	No	No	No	No	No	No	No	No	No	No
2025										
Maximum modeled concentration (µg/m^3)	8.48	1.18	0.29	<0.01	0.08	0.03	0.44	<0.01	0.07	<0.01
Background concentration (µg/m3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total concentration (µg/m3)	**2,820**	**2,409**	**63.0**	**6.26**	**11.3**	**10.7**	**78.8**	**15.3**	**15.0**	**4.65**
NAAQS/SAAQS (µg/m3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.1	24.1	33.5	6.3	5.8	0.8	52.5	30.6	43.0	38.8
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	No	No	No	No
Maximum modeled concentration (µg/m3)	8.48	1.18	0.29	<0.01	0.08	0.03	0.44	<0.01	0.07	<0.01
PSD Class I Increment (µg/m3)	-	-	-	2.5	25	-	8	4	2	1
Exceed PSD Class I increment? (Yes/No)	No	No	No	No	No	No	No	No	No	No

Hazardous Air Pollutants

In addition to criteria air pollutants, HAP may be emitted during construction through the use of construction equipment and industrial facilities. Mobile sources of hazardous air pollutant emissions result from fuel combustion in both on-and off-road vehicles. For vehicle operations associated with construction activities, worker commuting, and deliveries, the speciated hazardous air pollutant emissions include compounds such as acetaldehyde, formaldehyde, benzene, toluene, and xylene.

Table 3.3-7 shows the estimated annual HAP emissions for all construction-related emissions for the Proposed Action without combustion controls. The highest hazardous air pollutant emitted during construction would be formaldehyde at 0.30 ton. The combined total of all hazardous air pollutants emitted during construction would be approximately 0.82 ton. The potential to emit hazardous air pollutants would be less than 10 tons per year for any individual hazardous air pollutant, and less than 25 tons per year for all hazardous air pollutants combined; therefore, the

Project would not be considered a major hazardous air pollutant emission source during construction. See the *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* for more details regarding the HAP calculations.

Table 3.3-7 Annual Construction Emissions (tons) of HAPs without Controls

Pollutant	2024	2025
1,3-butadiene	0.0019	0.0015
2,2,4-Trimethylpentane	0.0084	0.0065
Acetaldehyde	0.1071	0.0835
Acrolein	0.0196	0.0153
Benzene	0.0522	0.0407
Ethylbenzene	0.0049	0.0038
Formaldehyde	0.2988	0.2331
Hexane	0.0005	0.0004
Naphthalene	0.0047	0.0037
Propionaldehyde	0.2547	0.1987
Toluene	0.0379	0.0296
Xylene	0.0156	0.0122
Polycyclic Organic Matter	0.0048	0.0038

Public Health

Coccidioidomycosis, commonly known as Valley Fever, is primarily a disease of the lungs that is common in the southwestern United States and northwestern Mexico. Valley Fever can be transported through fugitive dust generated during construction and decommissioning. The occurrences of valley fever in Clark County are also low and the Project would implement Solar PEIS PDFs AQC1-1 and AQC1-2 as well as MM Air-1 to further reduce potential air quality impacts during construction. With the implementation of mitigation measures, the risk to workers of contracting Valley Fever would be minimized. See Section 3.11, Public Health and Safety for more information.

Operation and Maintenance Impacts

Worker vehicles traveling to and from the site and those conducting maintenance activities would emit some pollutants. Some emissions may occur through the use of generators, but the use of generators would only be operated during emergency situations and all generators would be routinely checked and maintained under 40 CFR Part 60 (Title V). Operation of the Project would involve the disturbance of portions of the Project site but would be mostly limited to use of roads. Wind events could disturb soils on the Project site, resulting in erosion and fugitive dust. Annual emissions of fugitive dust are shown in Table 3.3-8.

Table 3.3-8 Operational Emissions Offset (tons per year)

Emission source	VOC	SO_2	CO	NO_2	PM_{10}	$PM_{2.5}$
Without controls						
Worker vehicles	0.03	<0.01	0.25	0.01	0.05	0.01
Pickup trucks	<0.01	<0.01	0.03	<0.01	<0.01	<0.01
Onsite equipment	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pump and generator	<0.01	<0.01	0.02	0.02	<0.01	<0.01
Water trucking	<0.01	0.01	0.01	<0.01	0.02	<0.01
Net fugitive dust	—	—	—	—	244.59	36.69
Total	0.03	0.01	0.31	0.03	244.66	36.70
Total equivalent emissions generated for 400-MW non-renewable energy	—	23.64	—	169.10	—	—
Emissions offset	**—**	**23.63**	**—**	**169.07**	**—**	**—**
With controls						
Worker vehicles	0.03	<0.01	0.25	0.01	0.05	0.01
Pickup trucks	<0.01	<0.01	0.03	<0.01	<0.01	<0.01
Onsite equipment	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pump and generator	<0.01	<0.01	0.02	0.02	<0.01	<0.01
Water trucking	<0.01	0.01	0.01	<0.01	0.02	<0.01
Net fugitive dust	—	—	—	—	-52.99	-7.95
Total	0.03	0.01	0.31	0.03	-52.89	-7.90
Total equivalent emissions generated for 400-MW non-renewable energy	—	23.64	—	169.10	—	—
Emissions offset	**—**	**23.63**	**—**	**169.07**	**52.89**	**7.90**

The Project would undergo routine inspections of components based on a maintenance program schedule and as the monitoring schedule indicates. PV-module washing could occur periodically using water trucked to the site.

Under existing conditions (without the Proposed Action), the fugitive dust emissions of PM10 and PM2.5 from wind erosion would be 371 tons and 56 tons, respectively. During the initial operations (prior to vegetation regrowth when the portions of the ground are assumed to be relatively bare), the net (increase as a result of the Proposed Action) uncontrolled fugitive dust emissions of PM10 and PM2.5 from wind erosion would be 689 tons and 103 tons, respectively. That is, prior to the re-establishment of Project site vegetation and soil compaction, without controls, the fugitive dust emissions due to wind erosion would be higher than the existing condition. The facility is also incentivized to limit fugitive dust on site as dust can dramatically affect the energy output of solar cells. The National Renewable Energy Laboratory noted that energy loss due to dusk can amount to up to 7 percent in parts of the United States (Hicks, 2021). 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.

The Project would implement Solar PEIS PDF AQC1-3, which outlines compliance and monitoring requirements during operations. PEIS PDF AQC1-3 dictates that areas that have been graded, scraped, bladed, compacted, or denuded of vegetation must be monitored and treated. Compliance methods include reapplying palliatives or water as necessary for effective fugitive dust management and ensuring compliance of all combustion sources with state emission standards (e.g., best available control technology requirements).

During subsequent operations (as vegetation and soil compaction is re-established), the net (increase as a result of the Proposed Action) uncontrolled fugitive dust emissions of PM_{10} and $PM_{2.5}$ would be 245 tons and 37 tons, respectively. The Site Restoration Plan will include restoration and revegetation requirements to meet site success standards for temporary use areas such as laydown yards. Once the vegetation is re-established, the uncontrolled fugitive dust would be similar to the current existing conditions (no net change in fugitive dust emissions of PM_{10} and $PM_{2.5}$). With fugitive dust controls, the net (decrease as a result of the Proposed Action) fugitive dust emissions of PM_{10} and $PM_{2.5}$ from wind erosion would be a reduction of 53 tons and 8 tons, respectively, compared to the existing condition. Therefore, fugitive dust impacts during operations would not be adverse.

Decommissioning Impacts

Decommissioning activities are similar to construction activities but assumed to occur on a more limited scale and are of shorter duration. The potential effects on ambient air quality would be correspondingly smaller than those from construction activities. Accordingly, associated effects on ambient air quality would be temporary. An adverse effect on local air quality from fugitive dust emissions could occur.

The Project would implement Solar PEIS PDF AQC1-4, which states that reclamation of the site would incorporate the design features listed under Solar PEIS AQC1-2 to reduce the likelihood of air quality impacts associated with decommissioning. An adverse effect on local air quality from fugitive dust emissions during decommissioning is unlikely but could occur. Following decommissioning, areas of bare soil could continue to contribute fugitive dust for many years. The Site Restoration-Revegetation & Decommissioning-Reclamation Plan would include restoration and revegetation requirements to meet site success standards. Implementation of the Plan would restore areas to pre-construction conditions. Decommissioning would return the area to its pre-construction, natural conditions. Impacts would not be adverse.

Cumulative Impacts

Past and present actions, including existing land development, have contributed to the existing air quality conditions in the analysis area. Construction-related ground disturbance projected for other projects in the analysis area within the next 5 years would result largely from the development of other solar facilities, which could result in over 31,340 acres of development. The contribution to cumulative impacts from the Proposed Action would constitute an incremental increase in air pollutant within the analysis area.

The following projects were considered in the air quality cumulative impact analysis for the Proposed Action: Copper Rays Solar (Phase 1), Golden Currant Solar, and Yellow Pine Solar (Phase 2). The cumulative impact analysis for air quality focused on these cumulative projects for a period in 2025 in which a portion of each projects construction phase is proposed to occur.[2] While the schedules may shift further, the assumption that these four cumulative projects likely will have some overlapping schedule is valid, based on the information provided to date, and represents a reasonable worst-case scenario. Other solar projects would be built at different times or would be geographically further from the Proposed Action, and therefore the air quality construction effects would not overlap with the effects of the Proposed Action to result in a cumulative effect. Table 3.3-9 provides the estimated construction schedule for the cumulative projects.

Table 3.3-9 Anticipated Construction Schedule for the Cumulative Projects

Project name	Approximate size	Construction duration	Start of construction	End of construction
Copper Rays Solar (700 MW)	Phase I: 1,600 acres Phase II: 3,900 acres Gen-tie: 150 acres (5 miles) Access: 2.1 acres	Phase I: 18 months Phase II: 24 months	Phase I: June 2025 Phase II: December 2027	Phase I: December 2026 Phase II: December 2029
Golden Currant Solar (400 MW)	4,456 acres; gen-tie: 38 acres (2.1 miles)	15 months; up to 18 months	4th Quarter 2025	3rd Quarter 2026

[2] At this time, there are no definitive construction schedules for the cumulative projects. The assumptions are defined as it is feasible and represents potential project overlap. Based on the data known at the time air quality calculations were conducted, the projects had overlapping construction schedules. The schedules have been modified since, but still overlap to some degree with the Golden Currant Solar Project expected to be under construction during late 2025 through early 2027, the Rough Hat Clark Solar Project expected to be under construction from mid-2025 through mid-2027, and the Yellow Pine Solar Project (Phase 2) is expected to be under construction during the 12 months of 2025. Therefore, each of the four projects could be expected to be under construction during the later portion of 2025 and this overlapping of potential impacts represents the air quality cumulative quantitative analysis.

Yellow Pine Solar (500 MW)	Phase I: 2,261 acres Phase II (subarea D): 738 acres; gen-tie: 0.1 mile	Phase I: 24 months	Phase I: December 2021 Phase II (subarea D): TBD	Phase I: December 2023 Phase II (subarea D): TBD

To assess the Proposed Action and cumulative project impacts, two types of air quality analysis are performed: *emission inventory* and *dispersion modeling*. Emission inventories estimate the amount of air pollutants emitted by project sources; dispersion modeling uses these estimates, along with meteorological and other data, to derive predicted pollutant concentrations that can be directly compared to the ambient air quality standards. Table 3.3-10 provides the estimated construction emissions inventory for the cumulative impact analysis.

Table 3.3-10 Annual Construction Emissions (tons) with Controls – Cumulative

Project	VOC	CO	NO_2	SO_2	PM_{10}	$PM_{2.5}$
Rough Hat Clark	1.92	19.9	7.27	0.11	11.7	2.87
Copper Rays Phase 1	2.29	68.4	67.7	0.12	52.6	6.90
Golden Currant	7.78	50.9	16.6	0.52	31.7	6.56
Yellow Pine Phase 2	1.28	11.6	5.71	1.28	7.61	1.22

Dispersion modeling was also performed for the cumulative impact analysis to determine the ambient concentrations for CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$. Air dispersion modeling was performed to estimate the downwind dispersion of exhaust and fugitive emissions resulting from construction activities. The fundamental components of an air dispersion modeling analysis, including air dispersion model selection and options, receptor locations[3], meteorological data, and source exhaust parameters, were applied. The Proposed Action plus cumulative-project concentrations for each pollutant and averaging period were added to background concentrations, and the total concentrations were compared to the NAAQS/SAAQS. Table 3.3-11 displays the results of the cumulative impact analysis.

[3] The receptor grid for the Project-only dispersion modeling analysis includes public access locations that may be located within the cumulative projects as the assessment for the Proposed Action only assumes the cumulative projects would not be constructed. However, for the cumulative impact analysis, receptors within the cumulative projects' sites were not included as the cumulative impact analysis assumes the cumulative projects would be constructed and the public would not have access to the project sites.

Table 3.3-11 Estimated Maximum Concentration with Controls – Cumulative

Criteria pollutant	CO		NO_2		SO_2		PM_{10}		$PM_{2.5}$	
Averaging time	**1 Hour**	**8 Hour**	**1 Hour**	**1 Year**	**1 Hour**	**3 Hour**	**24 Hour**	**1 Year**	**24 Hour**	**1 Year**
Maximum modeled concentration (μg/m^3)	343	88.0	91.2	7.51	4.18	2.10	42.7	13.3	4.32	1.68
Background concentration (μg/m^3)	2,812	2,407	62.7	6.25	11.2	10.7	78.3	15.3	15.0	4.65
Total Concentration (μg/m3)	3,155	2,495	154	13.8	15.4	12.8	121	28.6	19.3	6.33
NAAQS/SAAQS (μg/m^3)	40,000	10,000	188	100	196	1,300	150	50	35	12
Percent of NAAQS/SAAQS	7.9	25.0	81.8	13.8	7.9	1.0	80.7	57.1	55.1	52.8
Exceed NAAQS/SAAQS? (Yes/No)	No	No	No	No	No	No	No	No	No	No

The cumulative concentrations are either lower, the same, or higher than for the Proposed Action exclusively depending on meteorological conditions, pollutant, the type of emissions (exhaust vs. fugitive dust), averaging period, and location of maximum concentrations. The three primary outcomes for the cumulative analysis are described in further detail, as follows:

- The cumulative concentration is the same as the maximum concentration from either of the cumulative projects alone (e.g., the cumulative concentration equals the maximum concentration from Copper Rays alone without any contribution from Rough Hat Clark or other cumulative projects).
- The cumulative concentration is higher than the maximum concentration from any one cumulative project alone (e.g., the cumulative concentration is greater than the maximum concentration from Copper Rays alone because it also includes some contribution from Rough Hat Clark or other cumulative projects).
- The cumulative concentration is lower than the maximum concentration from any one cumulative project alone (e.g., the cumulative concentration is lower than the maximum concentration from Copper Rays alone because the maximum concentration from Copper Rays occurs on the project site for Rough Hat Clark and although the public would have access to that location if only Copper Rays was developed; if Rough Hat Clark was also developed the public would not have access to that location and the cumulative concentration would be associated with a different location in which the public would have access).

Without combustion and fugitive dust controls the cumulative impact results would likely be above the NAAQS for NO_2, PM_{10}, and $PM_{2.5}$. However, these occurrences would be isolated in time and locations near the Projects' sites. With combustion and fugitive dust controls, the maximum CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ concentrations would not likely exceed the NAAQS. No adverse effect on local air quality from CO, NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emissions would occur.

Alternative 1 – Resources Integration Alternative

Construction Impacts

Alternative 1 would retain the same site location as the Proposed Action and would use similar types of construction and construction equipment. Alternative 1 would limit grading to 20 to 21.5 percent of the development area and require perennial vegetation to remain on 60 percent of the development area not graded by primarily using the overland travel method of construction. Because a large percentage of the PM_{10} and $PM_{2.5}$ emissions are related to vehicle travel on unpaved surfaces, reducing the amount of grading and the vehicle travel over unpaved surfaces would reduce these emissions. The emissions would be less than those for the Proposed Action, shown in Table 3.3-5 and Alternative 1 would not exceed the NAAQS with emission controls.

The differences in the combustion emission sources between the Proposed Action and Resources Integration Alternative would be highly speculative to determine (i.e., more/less construction employees, more/less haul truck trips, more/less construction equipment, shorter/longer construction schedule, and/or changes in the type of construction equipment). Therefore, the differences between the Proposed Action and Resources Integration Alternative focused on wind erosion fugitive dust emissions, which are a function of the acreage and the methodologies of construction site preparation.

For the Resources Integration Alternative, with fugitive dust controls, the net (decrease as a result of the alternative) fugitive dust emissions of PM_{10} and $PM_{2.5}$ from wind erosion would be a reduction of 158 tons and 24 tons, respectively, compared to the existing condition and fugitive dust emissions of PM_{10} and $PM_{2.5}$ from wind erosion would be a reduction of 105 tons and 16 tons, respectively, compared to the Proposed Action. [4]

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[4] The intent of the alternative is to minimize disturbance to vegetation and soils within the solar facility by setting maximum allowable disturbance thresholds during construction, setting restoration goals, and requiring advanced planning for access throughout the panel arrays. Restoration would be conducted over the lifespan of the project through a Site Restoration and Revegetation Plan. The Site Restoration Plan will include restoration and revegetation requirements to meet site success standards for temporary use areas such as laydown yards. Permanent disturbance areas would be the same as the proposed action, with the solar array blocks comprising 2,433 acres. However, the Disturbance in Acres by Project Construction Type would be different for the proposed action and the alternative. The proposed action would avoid 568 acres, conduct

Fugitive dust controls over the solar site would likely include dust palliatives as approved by BLM. A Dust Control Plan would be required by the Nevada Department of Environmental Protection for construction and operation and maintenance phase of the Project, which identifies the methods of reducing dust while demonstrating off-site impacts of the methods used would not occur. Alternative 1 would require a Dust Control and Air Quality Plan and Solar PEIS PDFs AQC1-1 and AQC1-2 as well as MM Air-1 to reduce emissions. As with the Proposed Action, a potential adverse effect on local air quality from combustion and fugitive dust emissions would not occur during construction.

Operations and Maintenance Impacts

Post-construction, Alternative 1 would result in less ground disturbance due to the reduced grading acreage and would be expected to result in less emissions of PM_{10} and $PM_{2.5}$ fugitive dust because comparatively less ground would be bare. Alternative 1 would implement Solar PEIS PDF AQC1-3, which outlines compliance and monitoring requirements during Project operation. Alternative 1 would reach pre-construction levels of fugitive dust emissions more quickly than the Proposed Action due to the reduced total ground disturbance. Operation and maintenance impacts would not be adverse.

Decommissioning Impacts

Decommissioning activities would be similar for the Alternative 1 as for the Proposed Action, and the air quality emissions are anticipated to be similar. Alternative 1 would implement Solar PEIS PDF AQC1-4, which dictates that reclamation of the site would incorporate the PDFs listed under AQC1-2 to reduce the likelihood of air quality impacts associated with decommissioning.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in the Nevada portion of the Pahrump Valley would incorporate similar techniques to reduce environmental effects in the Pahrump Valley. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. As such, it is assumed that the construction of solar projects (Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea) would all be developed using overland travel for a portion of their construction and would have overlapping construction as noted in Table 3.3-8.

overland travel on zero acres, perform clear and cut/drive and crush on 1,221 acres, and perform clear and cut/with soil removal on 644 acres (ordered by increasing level of disturbance). The alternative would avoid 567 acres, conduct overland travel on 888 acres, perform clear and cut/drive and crush on 591 acres, and perform clear and cut/with soil removal on 387 acres (ordered by increasing level of disturbance). In general, the alternative would shift to construction techniques with less disturbance on the ground surface and thus, would potentially produce less wind erosion as a result of the construction activities.

Alternative 1 would reduce the cumulative effects compared with the Proposed Action because of the reduced acres of grading by implementing the construction techniques from the Resources Integration Alternative. An overall reduction of grading of approximately 12,000 acres would result in reduced dust and particulate matter for nearby receptors.

No Action Alternative

Under the No Action Alternative, the solar facility, transmission line, and substation would not be developed. No surface disturbance would occur, and air resources would not be affected. Climate change would continue as defined by current trends. No adverse effects would occur.

Project Design Features and Mitigation Measures

The following Solar PEIS PDFs, identified and discussed in the Solar PEIS (Appendix A.2.2.12), SNDO PDF, and a Project-specific mitigation measure have been identified to avoid, minimize, and/or mitigate potential impacts on ambient air quality from solar development:

Solar PEIS Programmatic Design Features

- PEIS AQC1-1: Project developers shall consult with the BLM in the early phases of project planning to help determine the potential conformance to air quality and other potential constraints.
- PEIS AQC1-2: Solar facilities shall be sited and designed and constructed to minimize impacts on air quality.
- PEIS AQC1-3: Compliance with the terms and conditions for air quality shall be monitored by the project developer. Consultation with BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- PEIS AQC1-4: Reclamation of the site shall incorporate the design features listed above for construction under AQC2-1 to reduce the likelihood of air quality impacts associated with decommissioning.

Southern Nevada District Office Project Design Features

- SNDO AIR-1: If soils along the access road route are dry during road construction, use, and/or maintenance, fresh water would be applied to the road surface to facilitate soil compaction and minimize soil loss as a result of wind erosion.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Dust Control and Air Quality Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- MM Air-1: Other measures (in addition to PEIS AQC1-1 through AQC1-4, found within the PEIS) that shall be implemented to reduce emissions include the following:
  - Develop and encourage a voluntary carpooling program to minimize employee trips to the Project site.
  - Install a gravel pad or similar trackout control device to reduce mud/dirt trackout from unpaved truck exit routes.
  - Stabilize long-term storage piles through the use of water, BLM-approved palliative, physical enclosures, or other means.

- Install and use real-time dust/air monitors or alternatively ensure that at least two properly trained dust monitoring personnel are on site during construction phase ground-disturbing activities. Develop a detailed response program as part of the Project's Dust Control Plan. The detailed response program shall include the following:
    - Notification procedures for construction crews if dusty conditions (as defined by Clark County opacity thresholds) are detected.
    - Notification procedures for construction crews if dusty conditions (as defined by Clark County opacity thresholds) are detected.
    - Notification procedures for construction crews if dusty conditions (as defined by Clark County opacity thresholds) are detected.
- Limit grading and travel on unpaved access road on days with an Air Quality Index forecast of greater than 100 for particulates for the project area. [5]

Irreversible or Irretrievable Impacts

Emissions of air pollutants associated with construction activities would result in short-term increases in the amount of pollutants in the local, ambient air. Sources of air pollution associated with long-term operations would increase as a result of substation and solar facility maintenance, but at a much lower level than during the construction phase (less than 1% of the impacted counties' total emission inventory for all evaluated pollutants).

Localized increases in the amount of air pollutants would persist during the operation of the Project but would dissipate relatively quickly following the closure of the Project. Therefore, there would be no irreversible impacts on air quality in the area. However, the impacts to air quality during the operation would constitute an irretrievable impact.

[5] An Air Quality Index value of 100 generally corresponds to the ambient air quality standard for the pollutant, which is the level USEPA has set to protect public health. Air Quality Index values at or below 100 are generally satisfactory for public health.

3.4 Biological Resources – Wildlife, Migratory Birds, and Other Special Status Wildlife

3.4.1 Introduction

This section identifies wildlife, migratory birds, and other special status wildlife species that are known to occur or could occur within the Pahrump Valley and that could be affected by Project construction, operation and maintenance, and decommissioning. The BLM manages wildlife habitat and special status species in accordance with the 1998 Las Vegas RMP, as amended, BLM Manual 6500 Fish and Wildlife Conservation, and BLM Manual 6840 Special Status Species Management. Avian species are protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended, Executive Order 13186 Responsibilities of Federal Agencies to Protect Migratory Birds, and the Bald and Golden Eagle Protection Act (BGEPA). Wildlife conservation by the state of Nevada is regulated under Nevada Revised Statutes (NRS) Title 45 and is further guided by the Nevada Wildlife Action Plan (Nevada Department of Wildlife 2022). Additional information on laws and regulations pertaining to special status wildlife and migratory birds are provided in Appendix E.

General wildlife includes common species that are neither federally or state protected nor BLM sensitive species. Wildlife with some special status includes state or federally protected species, BLM sensitive species, avian species protected under the MBTA or BGEPA, USFWS birds of conservation concern (BCC), and Nevada Department of Wildlife (NDOW) species of greatest conservation need (SGCN). Federally listed species are addressed further in Section 3.5: Biological Resources, Threatened and Endangered Species.

BLM sensitive species are designated by the State Director and include species listed or proposed for listing under the federal Endangered Species Act (ESA) and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. In addition, all federal candidate species and delisted species are considered BLM sensitive species in the 5 years following delisting.

The BLM provides policy and guidance for the conservation of BLM special status species and habitat on BLM-administered lands. Objectives of the BLM special status species policies are to conserve or recover ESA-listed species and habitat so that ESA protections are no longer needed and to initiate proactive conservation measures that reduce or eliminate threats to BLM sensitive species so as to minimize the need for future listing under the ESA. Note that some of the categories of species included here do not fit the BLM's definition of special status species as defined in BLM Manual 6840. These species are included here to ensure a broad consideration of wildlife that may be most vulnerable to impacts.

3.4.2 Analysis Area

The analysis area for consideration of impacts related to habitat connectivity and migration for wildlife, migratory birds, and other special status wildlife consists of the Project site and greater Pahrump Valley and adjacent mountain ranges. This area is intended to capture existing conditions and potential impacts to individuals, habitats, and movement corridors for wide-ranging species such as bats, birds, and larger mammals that may have the potential to occur. For wildlife with smaller home ranges (such as reptiles and small mammals), most of the effects would be limited to the Project site and immediate vicinity. In accordance with USFWS guidance for protection of nesting eagles, the analysis area for golden eagle (*Aquila chrysaetos*) extends up to 10 miles from the Project site boundary.

For cumulative effects, the analysis area includes projects in the Pahrump Valley and adjacent contiguous areas. Other projects or management actions within this area would be expected to affect similar vegetation and habitat and, therefore, wildlife. This area generally accounts for the area within which a similar population of a species or habitat could occur. Cumulative projects or actions within the region would affect habitat necessary to conserve the genetic, behavioral, morphological, and ecological diversity conducive to long-term sustainability of species.

3.4.3 Affected Environment

Wildlife

The Mojave Desert is principally inhabited by heat-tolerant flora and fauna with specialized adaptations for life in a harshly arid environment. Habitats within the greater Project area support a variety of desert-adapted wildlife characteristic of the region. Sonora-Mojave Creosote Bush – White Bursage Desert Scrub and Mojave Mid-elevation Mixed Desert Scrub are the dominant vegetation communities within the analysis area and provide essential habitat for a diverse complement of wildlife (Nevada Department of Wildlife 2022). Many animals utilize desert scrub for shelter, forage, thermal regulation, and protection from predators as well as for perching and nesting structures. Animals often dig burrows around the roots of larger shrubs such as creosote. The most frequently observed vertebrates in the desert communities are mammals, reptiles, and birds, many of which have special conservation status that will be addressed in the following sections (refer to Table 3.4-1 in Appendix D). There are no perennial sources of water; however, several ephemeral drainages flow through the Project area. Ephemeral drainages and dry washes provide important habitat sources and are often used as movement corridors by a range of species.

Mammals that may occur within the analysis area include small nocturnal rodents such as kangaroo rats (*Dipodomys* spp.) and pocket mice (*Chaetodipus* spp.). Many different bats are known to inhabit the greater Pahrump Valley and may be in the area during nocturnal foraging, but there are no known or expected roosting locations or hibernacula within the Project site or immediate vicinity. The nearest roosting habitat is likely present in the Spring Mountains, approximately 3 miles from the Project site. Other smaller mammals that may be present include black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), and round-tailed ground squirrel (*Xerospermophilus tereticaudus*). Larger mammalian species known to occur within the Pahrump Valley and that may occur within the Project site include mountain lion (*Puma concolor*), coyote (*Canis latrans*), gray fox (*Urocyon cinereoargenteus*), kit fox (*Vulpes macrotis*), American badger (*Taxidea taxus*), and mule deer (*Odocoileus hemionus*). Elk (*Cervus canadensis*) and desert bighorn sheep (*Ovis canadensis nelsoni*) may move through the area to migrate between suitable habitat located in surrounding mountain ranges. Wild horses (*Equus ferus*) and burros (*Equus asinus*) may be present, but there are no BLM habitat management areas for these species within the Pahrump Valley.

Numerous reptile species, many of which are protected by state or federal regulations, have the potential to occur within the Project area. Species that may be present include long-nosed leopard lizard (*Gambelia wislizenii*), side-blotched lizard (*Uta stansburiana stejnegeri*), desert iguana (*Dipsosaurus dorsalis*), Gila monster (*Heloderma suspectum cinctum*), zebra-tailed lizard (*Callisaurus draconoides*), Great Basin western whiptail (*Aspidoscelis tigris* ssp. *tigris*), Great Basin collared lizard (*Crotaphytus bicinctores*), chuckwalla (*Sauromalus obesus*), desert horned lizard (*Phrynosoma platyrhinos*), Mojave western patch-nosed snake (*Salvadora hexalepis mojavensis*), northern Mojave rattlesnake (*Crotalus scutulatus scutulatus*), sidewinder (*Crotalus cerastes*), southwestern speckled rattlesnake (*Crotalus pyrrhus*), desert night snake (*Hypsiglena torquata*), California king snake (*Lampropeltis getula californiae*), western patch-nosed snake (*Salvadora hexalepis*), glossy snake (*Arizona elegans*), shovel-nosed snake (*Chionactis occipitalis*), western banded gecko (*Coleonyx variegatus*), and the federally threatened Mojave desert tortoise (*Gopherus agassizii*) (refer to Section 3.5: Biological Resources, Threatened and Endangered Species for information).

A diversity of birds frequent the Project site on a seasonal basis. Avian surveys performed from March 2021 through December 2022 recorded 61 different species (Heritage Environmental Consultants 2023). The BLM also maintains acoustical monitoring stations throughout the Pahrump Valley, and 59 different species were recorded from 2019 to 2022 (NewFields 2022). Several BLM sensitive species are among those that have been detected in the Project area, and most avian species observed are protected under the MBTA. Other species not protected under the MBTA or other regulations may occur within the Project area and include Eurasian collared dove (*Streptopelia decaocto*), house sparrow (*Passer domesticus*), and rock pigeon (*Columba livia*).

There are many terrestrial invertebrate species that can be found within the Project site. Invertebrates are a vital dietary resource for other wildlife as well as important pollinators for native vegetation and are often critical to healthy and functioning ecosystems. General types of terrestrial invertebrates found in Mojave Desert habitats include moths, butterflies, ants, beetles, spiders, scorpions, grasshoppers, and crickets.

Threats to wildlife in the Mojave Desert include habitat destruction and fragmentation from development (including utility-scale renewable energy projects), highways, uncontrolled OHV use, natural resource extraction, and invasive species (Nevada Department of Wildlife 2022). Climate change has been exacerbating these impacts and increasing pressure on limited resources. Recent trends of decreasing precipitation, changing frequency of intense storms and related flood events, increased occurrence of wildfires, and persistent drought have been occurring across the region. A study of Mojave Desert bird communities found that 39 of the 135 bird species observed are less common and widespread as of 2018 compared to a century prior due to decreasing precipitation and changes in climate (Iknayan and Beissinger 2018). Climate change is modeled to continue to increase temperatures in the Mojave Desert over the coming decades and result in decreased habitat suitability for many species (Comer et al. 2012; Inman et al. 2016). Overharvesting of highly desirable reptiles is also affecting wildlife populations throughout the Mojave Desert region. Susceptible species include chuckwalla, collared lizards, and desert iguana, among others.

Migratory Birds

Migratory bird species are protected under the MBTA (16 U.S.C. §§ 703–711), which makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, any migratory bird, or the parts, nests, or eggs of such a bird, except under the terms of a valid permit issued pursuant to federal regulations. All species native to the U.S. or its territories are protected under the MBTA. 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 site are considered migratory birds.

Migratory bird species known or with the potential to occur within the analysis area are commonly found within the Mojave Desert region. Out of the 61 different bird species detected in the Project site during surveys, 57 species are protected under the MBTA (Heritage Environmental Consultants 2023). The most commonly observed and/or recorded species include black-throated sparrow (*Amphispiza bilineata*), sagebrush sparrow (*Artemisiospiza nevadensis*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), western bluebird (*Sialia mexicana*), ash-throated flycatcher (*Myiarchus cinerascens*), phainopepla (*Phainopepla nitens*), verdin (*Auriparus flaviceps*), white-crowned sparrow (*Zonotrichia leucophrys*) and northern mockingbird (*Mimus polyglottos*). Other BLM-sensitive or State of Nevada protected species that may be found in the Project area include Bendire's thrasher (*Toxostoma bendirei*), Brewer's sparrow (*Spizella breweri*), burrowing owl (*Athene cunicularia*), crissal thrasher (Toxostoma crissale), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), Le Conte's thrasher (*Toxostoma lecontei*), loggerhead shrike (*Lanius ludovicianus*) phainopepla (*Phainopepla nitens*), sage thrasher (*Oreoscoptes montanus*), and verdin (*Auriparus flaviceps*). While these species are also protected as migratory birds, some are resident of the region and are present in the Project area year-round. The full list of birds that may be impacted by the project are listed in Table 3.4-1 in Appendix D.

The golden eagle is protected under the MBTA and the BGEPA (16 U.S.C. § 668). The Project site supports suitable foraging habitat for golden eagles but no suitable nesting habitat. The nearest nesting habitat for golden eagles is approximately 3 miles east of the Project site, in the Spring Mountains. Bald eagles are not expected to be present due to the lack of large waterbodies in the greater area.

Special Status Wildlife

The only federally listed or proposed species known to inhabit the Project site is the Mojave Desert tortoise. Two federally endangered bird species, Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) and southwestern willow flycatcher (*Empidonax traillii extimus*), are known to migrate through the Pahrump Valley to freshwater marshes in nearby Ash Meadows National Wildlife Refuge (NWR) and could be affected by the Project but do not occupy habitat found within the Project site. Federally listed species are addressed in Section 3.5: Biological Resources, Threatened and Endangered Species.

All bats are protected in the state of Nevada (NAC Chapter 503) and are identified as SGCN in the Nevada Wildlife Action Plan, and all those that may be present in the Pahrump Valley are also BLM sensitive species. Fourteen bat species were identified as having some likelihood to occur in the analysis area, including Allen's big-eared bat (*Idionycteris phyllotis*), big brown bat (*Eptesicus fuscus*), big free-tailed bat (*Nyctinomops macrotis*), Brazilian free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), canyon bat (*Parastrellus hesperus*), fringed myotis (*Myotis thysanodes*), little brown bat (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), pallid bat (*Antrozous pallidus*), spotted bat (*Euderma maculatum*), Townsend's big- eared bat (*Corynorhinus townsendii*), western small-footed myotis (*Myotis ciliolabrum*), and Yuma myotis (*Myotis yumanensis*). Bats would only be expected to be present within the Project site during nocturnal foraging, especially when water is present within the desert washes and insects are more abundant. Little to no suitable roosting habitat for bats is found in the analysis area. No trees, rock outcrops, caves, mines, or other manmade structures (such as bridges or buildings) are present, and the analysis area does not have any perennial water resources to attract bats. The nearest potential roosting sites and perennial water sources are present in the Spring Mountains, approximately 3 miles away. Some bats migrate and others hibernate through the winter to survive year-round in the Mojave Desert.

Three larger mammals may occur within the Project area. The desert bighorn sheep is a BLM-sensitive species that is also regulated in the state of Nevada as a game mammal (NAC Chapter 503) and is a NDOW SGCN. It is known to inhabit the Spring Mountains and, while this species would not be expected to inhabit the Project site for extended periods of time, individuals could use the area for movement to adjacent habitat. Mule deer and kit foxes have been observed throughout the Pahrump Valley and could occupy habitat types found within Project site. Kit foxes are regulated fur-bearing mammals in the state of Nevada (NAC Chapter 503), and mule deer are regulated game mammals.

The Project area supports habitats often occupied by a number of special status reptile species. Out of the variety of reptiles known or suspected to occur within the Pahrump Valley, the following have federal and/or state protections: chuckwalla, desert horned lizard, desert iguana, Gila monster, glossy snake, Great Basin collared lizard, long-nosed leopard lizard, Mojave desert tortoise, sidewinder, and shovel-nosed snake. All are BLM sensitive species and all but the long-nosed leopard lizard and shovel-nosed snake are also NDOW SGCN. Additionally, Gila monsters are protected reptiles in the state of Nevada (NAC Chapter 503), and Mojave desert tortoises are both federally and state listed threatened species (see Section 3.5: Biological Resources, Threatened and Endangered Species).

Two special status terrestrial invertebrates have the potential to occur within the analysis area. The monarch butterfly (*Danaus plexippus plexippus*) is a federal candidate species for listing under the ESA as well as a NDOW SGSN. The northern Mojave blue (*Euphilotes mojave virginensis*) is a BLM sensitive species and a NDOW SGCN. Arid environments do not generally have vegetation communities with large numbers of nectar-producing plants, and these species would not be expected to occur in abundance. However, larvae host plant species (desert milkweed [*Asclepias erosa*] for monarchs and wild buckwheat [*Eriogonum* spp.] for Mojave blue) have been observed within the analysis area during surveys.

3.4.4 Environmental Consequences

Methodology

Analysis of effects to wildlife includes evaluating temporal and spatial impacts to habitats and species potentially present within the proposed Project site and within a regional geographic context. Expected presence of or impacts to wildlife from the Project are based on data provided by the BLM for species known to occur within the region as well as on desktop and field evaluations of habitat within the analysis area. Species identified for analysis were derived from 1) an online review of the USFWS Information for Planning and Consultation (IPaC) species lists for the Project site and regional vicinity (U.S. Fish and Wildlife Service 2022), 2) the BLM Southern Nevada District Office list of sensitive species (BLM 2017), 3) species declared as protected by the State of Nevada (Nevada Administrative Code [NAC] chapter 503), and 4) species identified by the NDOW as SGCN (Nevada Department of Wildlife 2022). The list of species known or suspected to occur was further refined through coordination with BLM SNDO and NDOW staff.

Biological surveys have been conducted for Mojave desert tortoise (refer to Section 3.5: Biological Resources, Threatened and Endangered Species) and migratory birds. Detailed descriptions of avian surveys conducted for the Project and their findings are found in the *Rough Hat Clark Solar Project Avian Survey Report Year 1 2021–2022* (Heritage Environmental Consultants 2023). Focused surveys for other wildlife have not been conducted in the analysis area. An integrated vegetation survey was performed that focused on characterizing the vegetation and habitat conditions within the Project site.

Methods and results of these studies are documented in the *Rough Hat Clark Solar Project Integrated Vegetation Survey Report* (Heritage Environmental Consultants, LLC 2022).

Direct effects to wildlife include actions that cause disturbance from noise, harassment, entrapment, injury, and mortality as well as habitat loss, changes in habitat use or behavior such as movement, foraging, or breeding. Indirect effects could occur through changes in the characteristics or quality of habitat through degradation or modification.

Effects to wildlife would be short-term, long-term, and permanent. Short-term effects would be associated with Project construction and would not be expected to persist past 5 years following completion of the construction and reclamation of temporary use areas. Long-term effects would be expected during operation and maintenance activities for the 30-year duration of the Project, and permanent effects would be expected in areas of complete removal of native vegetation (refer to Section 3.16: Vegetation, Special Status Plants, and Noxious Weeds). This timeframe reflects the slow recovery rates of plant communities in desert ecosystems, which could take a century or longer to fully recover, if at all. Long-term effects to wildlife beyond 30 years become increasingly difficult to predict due to the many unknown species interactions and environmental variables that may occur.

3.4.5 Proposed Action

Construction Impacts

Wildlife, Including Special Status Species

Direct and indirect effects to wildlife, including special status species, could occur from habitat disturbance caused by site preparation and construction activities associated with the Proposed Action that would affect a total of 1,950 acres of suitable habitat for wildlife in the Project area. Construction impacts would result in 649acres of existing habitat permanently removed by grading and another 1,301 acres of habitat proposed for drive and crush, which would result in a combination of approximately 26 percent permanent and 52 percent temporary disturbance in the Project area (2,469 acres), depending on the extent to which plants are crushed and how repeatedly vehicle traffic occurs over an area. With this construction method, soils would be disturbed and compacted but left in place and the soil seed bank retained to facilitate the eventual recovery of some vegetation. Plants that do continue to grow within the solar field would be expected to provide various types of habitat function, such as forage and shelter, but this habitat would be of lower quality due to the loss of perennial vegetation, smaller stature of plants, and reduced seed sources available on site. The Project would be constructed to avoid several major ephemeral drainages and would retain some areas of undisturbed desert wash habitat (approximately 519 acres or 21 percent for the Project area).

Ground Disturbance

Ground disturbance and vegetation removal or trimming could result in direct adverse effects to wildlife including stress, injury, mortality, or displacement. Equipment and vehicles could strike or crush slow-moving species, those seeking refuge in or under vegetation, species in subsurface burrows, or nesting birds. Vegetation removal could kill individual western monarch butterfly larvae or pupae if present on milkweed, and if work occurs during December 1 through March 15 when western monarch butterfly eggs, caterpillars, and pupae could be present. Occupied burrows or nests that are undetected prior to construction could be crushed or destroyed by construction equipment, earthwork, and mowing.

Entrapment could also occur in areas of excavation or trenching that would be deep enough for certain wildlife to get trapped (such as snakes or small mammals). Soils would become compacted and less likely to support habitat for burrowing species. Implementation of Solar PEIS PDF ER2-1 would reduce the potential for direct harm to wildlife, which requires conducting pre-construction surveys by a qualified biologist in coordination with the BLM, USFWS, and NDOW prior to any ground-disturbance or vegetation removal for all elements of the Project including the solar project, energy storage system, linear and ancillary facilities, O&M building, substation and gen-tie line, acceleration and deacceleration lanes and access road, and auxiliary and telecommunication line (for an explanation of Solar PEIS PDFs please refer to Section 3.4.8). It also requires having approved monitors on site during construction to ensure that wildlife species are not present in or near Project areas; these personnel would be qualified to capture, handle, and relocate animals that could be harmed and are unable to leave the site on their own. Access roads would be used with measures to minimize the risk for vehicle collisions, including speed limits and carpooling to reduce traffic. Also, in accordance with ER2-1, any occupied nests, dens, or burrows detected during surveys would be flagged for avoidance until the appropriate agency is consulted to determine measures to avoid impacts. Other measures to prevent direct harm to wildlife include PDF ER1-1 to ensure the Worker Environmental Awareness Plan (WEAP) includes discussion of wildlife avoidance and PDF ER2-1 to prevent injuries to wildlife by equipment and potential entrapment areas. In addition to general pre-construction surveys required by PEIS PDF ER2-1, MM WILD-2 requires pre-activity surveys for western monarch butterflies for vegetation removal activities that occur from December 1 through March 15 and could damage milkweed.

Visual, Noise, and Vibration Disturbance

Many animals are susceptible to visual, noise, and vibration disturbances caused by the presence of humans and construction equipment. Anthropogenic noise can interrupt vocal communication, disrupt predator-prey relationships, and cause physiological effects such as increased stress, weakened immune systems, and reduced reproductive success (Lovich & Ennen, 2011; Shannon, et al., 2016). Noise response varies among wildlife, and much of the research on terrestrial animals has focused on changes in vocal behavior, such as in bird or bat calling (Shannon, et al., 2016). Burrowing animals, such as reptiles and small mammals, are particularly susceptible to ground vibrations. Such disturbances could cause wildlife to alter foraging and breeding behavior and avoid suitable habitat; however, construction activities would be temporary and would not be expected to result in long-term disturbance or avoidance. Although direct injury or mortality is the most obvious negative impact, construction activities may also affect wildlife behavior in response to associated disturbances. These changes could decrease individual fitness and lower the chances of survival or reproduction, potentially resulting in population-level impacts that are harder to quantify without long-term demographic studies (Chock, et al. 2021). In accordance with Solar PEIS PDF ER1-1, the Project would be implemented in coordination with the BLM, USFWS, and NDOW to develop restrictions on timing and duration of activities, including potential road closures and limited foot travel through sensitive habitat, to minimize disturbances from construction to nesting or breeding wildlife in the Project area. Per PDF ER2-1, noise reduction devices (e.g., mufflers) would be employed to minimize the impacts to wildlife from loud equipment.

Exposure to Herbicides and Other Toxic Substances

Exposure to herbicides or other hazardous materials could also directly affect wildlife. Contact or ingestion of chemicals can not only kill animals but is also known to disrupt hormone levels, potentially affecting behavior and the ability to reproduce. With implementation of PEIS PDF ER1-1 and in accordance with BLM regulations, only herbicides with low toxicity to wildlife would be used and would be applied in a manner consistent with their label requirements and agency guidance. PDF ER1-1 also requires a qualified biologist to conduct surveys prior to application of herbicides to identify the special measures or BMPs necessary to avoid and minimize impacts to wildlife. Herbicides would only be used in accordance with an approved Pesticide Use Plan and Integrated Weed Management Plan required as part of the BLM ROW grant and in accordance with BLM manuals and guidance provided in the Solar PEIS on vegetation treatments using herbicides (BLM 2016c; BLM 2007). Implementation of Solar PEIS PDF HMW1-1, HMW2-1, and the SPCCP, Hazardous Materials and Waste Management Plan, and WEAP would ensure proper use, storage, and spill prevention for hazardous materials. Measures for containment and disposal of hazardous waste outlined in these plans would reduce the likelihood that spills would significantly affect wildlife.

Movement Barriers

Other direct effects to wildlife could occur from permanent security fencing and tortoise-exclusion fencing installed around the Project site, which would interfere with the movement and habitat use by animals too large to fit through or under the fence, such as ungulates, mountain lions, coyotes, and foxes. Those able to climb the fence could be injured by barbed wire lining the fence perimeter at the top or become entrapped in the fencing material. The Proposed Action and Alternative 1 would include construction of a single integrated security and tortoise-exclusion fence to minimize the amount of fencing required and maximize the freedom of movement for wildlife across the site. Furthermore, the Project is intended to share fencing with adjoining proposed solar projects, to the extent possible, to minimize overall fencing as well as to coordinate fence designs to maximize the ability for wildlife to move between sites. Once the Project and any neighboring projects are fully cleared of tortoise, tortoise-exclusion fencing could be lifted between the adjoining areas, and an eight-inch gap between the fence and the ground would remain for non-tortoise wildlife to move underneath (more information is included in Section 2.3.2 of Chapter 2).The existing SR 160 tortoise-exclusion fencing could reduce the need for tortoise-exclusion fencing along the perimeter of the Project.

Lighting

Nocturnal species could be adversely affected by night-lighting associated with construction, including small rodents, birds, and bats. Night-lighting installed for safety purposes may create light pollution in foraging areas, which may disorient wildlife. However, because construction activities would primarily occur during daylight hours, minimal lighting would be required at night and any construction at night and associated construction-related lighting would be temporary and follow the requirements in the Solar PEIS PDF VR2-2. In accordance with Solar PEIS PDF VR2-2 (minimization of night-sky effects), a Lighting Plan would be developed and approved by the BLM prior to construction that would minimize the direct and indirect effects that night-lighting could have on wildlife. This plan would require the Project to commit to full darkness at night during construction unless actively working at night, and any lighting required for safety and security would be activated by a motion sensor to only come on as needed and be set on a timer to turn off after 30 minutes.

Increased Predation

The Project infrastructure may also indirectly cause mortality of some wildlife by increasing the risk of predation by introducing attractants (such as trash) for ravens or coyotes as well as perch features (such as transmission lines) that could provide increased hunting and nesting opportunities for raptors and ravens and increased predation of small mammals, reptiles, and birds. Increased predation would be minimized by the implementation of PEIS ER2-1 and the Raven Management Plan required as part of the BLM ROW grant, which requires measures to reduce the attractiveness of the Project site and infrastructure to opportunistic predators, such as litter control programs, designing structures to discourage use as potential nest sites, hazing, and active monitoring of the site for presence of predators. Further, the physical complexity of the solar arrays could provide more hiding opportunities from aerial predators for some ground-dwelling species.

Indirect Effects to Habitat

Construction of the Project would have the potential to indirectly impact wildlife in surrounding areas outside of the Project area. Habitat loss, degradation, and fragmentation from native vegetation removal of up to 1,950 acres, fencing, and the potential for introduction and spread of invasive species would reduce forage, shelter, nesting, and migration opportunities to wildlife. This would cause species to rely more heavily on habitat in surrounding areas, which could increase competition for limited resources in those areas and could create barriers to gene flow (Grodsky, Moore-O’Leary and Hernandez 2017). Loss of nesting habitat or burrows would cause wildlife to search for or dig new burrows or build new nests, subjecting them to stress and causing interruption to normal breeding periods, potentially resulting in a loss of reproduction (Grodsky, Moore-O’Leary and Hernandez 2017).

Construction of the Proposed Action would alter disturbance regimes within the Project site and facilitate the spread of invasive species, which in turn may alter species interactions (Lovich and Ennen 2011; Tanner et al. 2014). Increased invasive species cover, which creates highly flammable fine fuels across the landscape, could also increase the risk of wildfires and result in additional habitat loss. Indirect effects from invasive species would be reduced with implementation of the Integrated Weed Management Plan that would be developed to control invasive species within the Project site and minimize the spread into adjacent habitats.

Mojave Desert vegetation communities support a high diversity of insect pollinators and plants with which pollinators have coevolved. Recent studies have shown that solar energy development negatively affects pollinators, including butterflies, bees, flies, and beetles (Grodsky, Campbell and Hernandez 2021). However, this study shows less disruption in areas that have been mowed as opposed to graded (Grodsky, Campbell and Hernandez 2021). Disruption of pollinator populations may lead to cascading effects on biodiversity, including potential decreases in globally imperiled and highly valuable cacti populations dependent on insect pollination (Grodsky, Campbell and Hernandez 2021, Wagner, et al. 2021).

Conclusion

Other mitigation measures and applicable Solar PEIS and SNDO-required PDFs would be implemented to further minimize the direct and indirect effects to wildlife from construction of the Project. MM WILD-1 requires disturbance areas to be refined and designed to the minimum size needed to safely operate the facility, including access roads, prior to issuance of a Notice to Proceed (NTP) for construction. In accordance with PDF ER2-1, a Site Restoration Plan would be developed that would require restoration of native plant communities as quickly as possible in areas temporarily disturbed during construction, either through natural revegetation or by seeding and transplanting using weed-free native grasses, forbs, and shrubs. This would reduce the amount of habitat loss and would speed up the recovery of natural habitats. PDF ER1-1 requires designation of a qualified biologist who will be responsible for overseeing compliance with all PDFs related to the protection of ecological resources throughout all Project phases, particularly in areas requiring avoidance or containing sensitive biological resources. ER1-1 also requires measures to ensure mitigation and monitoring of impacts on special status wildlife in coordination with appropriate federal and state agencies.

Even with the implementation of PDFs and mitigation measures as described above (see Appendix B for more details), construction of the Project would still result in large areas of habitat loss and disturbance as well as significant movement barriers for some wildlife in the area. While these measures would reduce the potential for adverse effects, the impacts to regional wildlife would remain adverse.

Migratory Birds

Implementation of the Proposed Action could affect migratory birds during construction of the Project by removing or altering 1,950 acres of potential migratory bird habitat from construction and operation of the proposed solar facility. Construction activities have the potential to cause visual and auditory disturbance, which could result in avoidance of otherwise suitable habitats. This could indirectly contribute to stress and increased energetic costs as birds may end up nesting and foraging in less suitable habitat. Active bird nests in shrubs and those near or on the ground could be affected during construction activities that cause ground disturbance and vegetation removal or crushing, which could result in nest abandonment, nest destruction, and loss of chicks or eggs. Construction methods such as grading and leveling (649 acres), drive and crush (1,301 acres), and vegetation trimming would reduce available cover, foraging areas, and nesting and perching structures and would likely result in displacement of bird populations. These impacts would be minimized by implementation of Solar PEIS PDF ER1-1, which requires the Applicant to develop measures to protect migratory birds in coordination with the BLM, USFWS, and NDOW, including a Bird and Bat Conservation Strategy Plan approved by the BLM prior to construction. These measures include restrictions on the timing and duration of activities developed in coordination with the agencies to minimize impacts to nesting birds from Project activities. Habitat-altering activities would be avoided during the breeding season to the extent possible, which generally occurs from February 15 through August 31. If a Project-related activity must occur during the breeding season, Solar PEIS PDF ER2-1 requires a qualified biologist to conduct nesting bird surveys immediately prior to commencing construction activities, including for burrowing and ground-nesting species as well as for those nesting in vegetation. If active nests are detected, the nest area shall be flagged, and no activity shall take place near the nest until the appropriate agencies agree that construction can proceed with the incorporation of monitoring measures. Spatial buffers would be applied depending on the biological needs of the species and susceptibility to anthropogenic disturbances and could vary with changes in site conditions.

Birds are also susceptible to collision and electrocution associated with overhead power lines. The Applicant proposes an overhead 230 kV gen-tie line up to approximately 1.5 miles in length, an overhead 34.5 kV collection system within the solar array, an up to 75 foot tall distribution line, and an up to 120 foot microwave tower. Impacts associated with collision and electrocution would be minimized in accordance with Solar PEIS PDF ER2-1, which requires implementing current guidelines and methodologies in the design of proposed transmission facilities to minimize the potential for avian species to collide with them or be electrocuted. Methods include installing mechanisms such as permanent markers or bird flight diverters to visually warn birds and deterrents on support structures and other facility structures to discourage use for perching or nesting. All overhead power lines would be constructed with avian-safe designs in accordance with Avian Power Line Interaction Committee (APLIC) suggested practices (APLIC 2006) and, to the extent practicable, tall structures would be sited to avoid known flight paths of avian species.

Burrowing owls may be present within the Project site and are particularly susceptible to the impacts associated with ground-disturbing activities that can result in injury or mortality to adult owls, nestlings, and/or eggs that may occupy a previously undetected burrow. Adult birds and fledglings are likely to avoid moving vehicles and other construction equipment although there is potential for them to be harmed if they are undetected underground during disturbance. Increased human activity and alterations to otherwise suitable habitats could displace birds. Ground disturbance, such as grading and drive and crush, could destroy some areas with existing burrows and directly impact nesting habitat for owls. Impacts would be minimized by implementation of Solar PEIS PDFs ER1-1 and ER2-1 as described above for migratory birds, including burrowing owl surveys prior to construction, following the USFWS protocol. Any nests discovered during surveys would be flagged and avoided until the young have fledged or it is determined the nest has failed and is no longer occupied to minimize impacts.

The Project site does not contain any suitable nesting habitat for golden eagles; however, there is the potential for golden eagles to forage within the Project site given the proximity to areas that could potentially be used for nesting. During construction, foraging golden eagles may be subject to visual and noise disturbance, potentially resulting in alteration of foraging behaviors. Eagles are wide-ranging species and use a variety of habitats for foraging, and large areas of undisturbed habitat in the greater Pahrump Valley and nearby Spring Mountains would be available. Foraging habitat within the Project site will be significantly modified. However, a large amount of suitable foraging habitat would remain available outside of the Project area for golden eagles.

While adverse impacts on migratory birds could occur from construction of the Project, most impacts would be short-term for the duration of Project construction (12-18 months) and would be minimized with the implementation of Solar PEIS PDFs ER1-1 and ER2-1 and the Bird and Bat Conservation Strategy Plan. The Bird and Bat Conservation Strategy Plan addresses the requirement of adaptive management based on the results of surveys outlined within the plan and adaptive management actions to address issues that arise from mortality monitoring. These actions could include installing bird flight diverters, changing Project components that have been identified as a mortality risk, or implementing other appropriate actions to address the issue(s) based on the data. Solar PEIS PDF ER1-1 also requires the Worker Environmental Awareness Plan (WEAP) to include information for the identification and protection of ecological resources, including nesting birds, which would be provided to all Project personnel prior to entering the worksite. In accordance with Solar PEIS PDF ER2-1, qualified biological monitors would be on site during site preparation and construction periods. Impacts to migratory and other special status bird species associated with Project construction are not expected to result in significant impacts to the total population nor would it directly contribute to substantial direct mortality; however, displacement of individuals from this area may put pressure on adjacent habitats.

Operation and Maintenance

Wildlife, Including Special Status Species

Operation and maintenance of the Proposed Action would result in some long-term and permanent disturbance of habitat within the Project site, and many direct and indirect effects to wildlife that would occur during construction would persist through the operation and maintenance phase. Impacts would include habitat loss, habitat fragmentation, movement barriers, degradation of adjacent wildlife habitat, direct mortality, increased noise, dust and dust-suppression effects, light pollution effects, and increased fire risk as a result of introduction and spread of invasive weed species (Abella 2010, Chambers, Brooks, et al. 2013, Grodsky, Tanner and Hernandez 2020, Lovich and Ennen 2011).

Areas graded and/or cleared of vegetation for the installation of facilities required for operation and maintenance of the Project, including O&M buildings, internal access roads, fencing and firebreaks, the substation, and the gen-tie line would not be reclaimed until after Project decommissioning and would result in lost habitat for the duration of the Project. Other areas used for temporary workspaces, such as temporary office buildings or laydown yards, as well as areas subjected to overland vehicle travel, would be reclaimed during the operation and maintenance phase once construction is complete in accordance with Solar PEIS PDF ER3-1 and the Site Restoration-Revegetation & Decommissioning-Reclamation Plan. While some of these areas would be subject to permanent impacts to native vegetation and associated habitats during construction (as described for disturbance levels for different construction methods in Chapter 2.0: Proposed Action and Alternatives and Section 3.14: Vegetation and Noxious Weeds), restoration and revegetation in these areas during operation would speed up the recovery from disturbance and provide some additional available habitat prior to decommissioning. The magnitude of ongoing disturbances to wildlife associated with operation and maintenance activities would be significantly less than that during construction.

Vegetation within the perimeter fence of the solar field would be allowed to grow up to 18 inches high but is unlikely to be of the same composition as existing vegetation. Remaining vegetation may still provide habitat for some small mammal, bird, reptile, and pollinator species. Areas where disturbances would be avoided would continue to provide sources of habitat during Project operation and maintenance; however, these areas are primarily desert wash habitat that may not be large enough or contiguous enough to support the same number of breeding wildlife populations. Species that may benefit during operation and maintenance include scavenger species that adapt easily to human-altered landscapes and small mammals or lizards that may be less vulnerable to predation within facility fences (Moore-O'Leary et al. 2017). Disturbance to wildlife associated with routine vegetation maintenance could occur, including trimming for operation and safety of the solar arrays and fire breaks. In accordance with Solar PEIS PDF ER2-1, surveys would be required prior to vegetation trimming in order to ensure no wildlife, including special status species, are occupying individual plants or areas of habitat affected.

Some wildlife would be unable to access the Project area throughout operation of the Project, which could have long-term effects on habitat use and movement patterns across the landscape. Wildlife too big to fit through or under the fence, such as mountain lion, mule deer, elk, and desert bighorn sheep would likely have to alter their use of migration corridors and foraging habitat throughout the area for the duration of the Project. Similar habitat occurs adjacent to the Project area, and it is anticipated that affected individuals too large to pass through the fence may be able to shift use to these adjacent areas. Smaller wildlife that can fit through or under the Project fences (such as rodents and reptiles), birds, and species known to dig or burrow (such as fox and badger) may still occupy the site; however, habitat quality would be reduced by disturbances to native vegetation. As described above and in Chapter 2.0: Proposed Action and Alternatives, security and tortoise exclusion fences would be constructed and maintained with passages designed for smaller wildlife to fit through holes in the fence or underneath the gap between the fence and the ground. Except for the perimeter fence, ephemeral drainages would be maintained without fencing or vegetation trimming and would continue to provide undisturbed habitat and movement corridors for wildlife within the Project ROW.

As with temporary construction lighting, permanent lighting for operational safety of the Project could result in light pollution in foraging areas for nocturnal species. In accordance with PEIS PDF VR2-2 (minimization of night-sky effects), a Lighting Plan would be developed that would include designs for the minimal security lighting that would be required during operation that would minimize the direct and indirect effects of night-lighting on wildlife. This plan would be reviewed by BLM and would require the Project to commit to full darkness at night during operation, and any lighting required for safety and security would be activated by a motion sensor or by light switches to only come on as needed. Other designs include using minimum-intensity lighting, vehicle-mounted lights for nighttime maintenance activities, and mounting lights in a downward position to minimize the amount of light pollution emitted. With implementation of the approved Lighting Plan, long-term adverse effects to nocturnal wildlife species within the Project site and immediate vicinity would not be expected for the duration of the Project.

Routine operation and maintenance activities are anticipated to result in slight increases in traffic along regional transportation routes (SR 160 and Tecopa Road) as well as internal access roads. The increase in traffic would result in an increase in the risk of direct mortality of or injury to wildlife from vehicle strikes and increased disturbance from the dust, noise, and ground vibrations associated with vehicle use. However, due to the relatively low level of operation and maintenance-related traffic and fencing around the Project site prohibiting access by some wildlife, the increased risk of collisions during operation and maintenance of the Project is anticipated to be minor. Additionally, the implementation of Solar PEIS PDFs would minimize the risk of collisions and the amount of dust, noise, and vibrations generated from vehicle use. These include PDF ER2-1, which requires reduced speed limits and carpooling, and PDFs SR2-1 and AQC2-1, which require erosion and dust-control measures and a Dust Abatement Plan as described in Section 3.3.

Operation and maintenance activities would increase the likelihood of introduction and spread of invasive weeds, which can increase fire risk in wildlife habitat and result in habitat degradation on and off site. Herbicides would be used as needed to control invasive species in accordance with the Invasive Weed Management Plan and could continue to expose wildlife to harmful materials. An Invasive Weed Management Plan and Fire Management Plan would be implemented, which would reduce the risk of fire and/or habitat degradation of surrounding habitat, but the Proposed Action would still likely result in a higher cover and density of invasive plant species within the Project area and in adjacent habitat over time.

During construction, PDF ER1-1 would require a qualified biologist to conduct surveys prior to application of herbicides during operation and maintenance to avoid or minimize impacts to wildlife. Herbicides would only be used in accordance with an approved Pesticide Use Plan and Integrated Weed Management Plan and in accordance with BLM Manuals and guidance provided in the Solar PEIS on vegetation treatments using herbicides (BLM 2016c; BLM 2007). Implementation of Solar PEIS PDF HMW1-1 and the SWPPP, Hazardous Materials and Waste Management Plan, and WEAP would ensure proper use, storage, and spill prevention for hazardous materials. Measures for containment and disposal of hazardous waste outlined in these plans would reduce the likelihood that spills during operation and maintenance would significantly affect wildlife. Overall, impacts to wildlife (including special status species) as a result of operation and maintenance are not anticipated to result in losses of long-term viability.

Migratory Birds

Operation and maintenance of the Project is likely to result in adverse impacts to bird species. Primary threats are from collisions with PV solar equipment and transmission lines and electrocutions from the substation and distribution lines. Collision potential would be greatest during bird migration season (Kosciuch et al. 2020). Avian interactions with PV solar facilities themselves are not well understood, and limited research exists regarding population-level impacts of PV solar facility mortality on birds. Because bird fatality data for PV solar facilities is limited, science-based predictions of potential bird risk are also limited. Avian collision with PV panels was a cause of death at PV solar facilities identified in the Multiagency Avian-Solar Coordination Plan (The Multiagency Avian-Solar Collaborative Working Group 2016), but the level of mortality observed at solar facilities and the effects on species populations is variable (Kosciuch et al 2016; Smallwood 2020).

There is concern over the effect large solar installations can have on migrating birds, in particular waterfowl that may mistake the PV solar arrays for waterbodies and try to land (known as the "lake effect"). The lake effect theory was first described in Horváth et al. (2009) as the effects on bird species from *polarized light pollution* (PLP) produced by large-scale solar energy projects. PLP refers to highly and horizontally polarized light reflected from artificial surfaces, which alters the naturally occurring patterns of polarized light experienced by organisms in ecosystems. Utility-scale PV solar facilities may attract migrating waterfowl and shorebirds through PLP, whereby migrating birds perceive the reflective surfaces of PV solar panels as bodies of water and collide with the structures as they attempt to land on the panels (Horváth 2009, Chock, et al. 2021, Kagan 2014, Chock, et al. 2021, Smallwood 2022, Kosciuch, Riser-Espinoza and Gerringer, et al. 2020, Kosciuch, Riser-Espinoza and Moqtaderi, et al. 2021). Many waterfowl species require waterbodies to take off and regain flight, which can result in their becoming stranded in habitats where they cannot survive. This hypothesis is being actively studied as the number and size of utility-scale (>20 MW) solar energy facilities dramatically increases across the southwestern United States (Chock, et al. 2021, Kosciuch, Riser-Espinoza and Moqtaderi, et al. 2021, Smallwood 2022). There are many reported anecdotal reports to support this theory, but to date limited research has been conducted to evaluate the attraction of PV facilities to migrating waterfowl or songbirds.

Impacts to migratory birds would be minimized through implementation of Solar PEIS PDF ER3-1, which requires methods to reduce impacts to avian species during operation and maintenance of the Project. These measures include turning off all unnecessary lights to avoid attracting migratory birds and removing nests, only if unoccupied, from areas that may cause harm to the species. All nests destroyed or removed during operation and maintenance of the Project would be reported to the BLM and USFWS. The Bird and Bat Conservation Strategy Plan would include a Bird and Bat Monitoring and Adaptive Management Plan for the Proposed Action to assist in avoiding and minimizing impacts on migratory birds for the duration of the Project. The monitoring would include reporting fatalities associated with powerlines and PV panels as well as overall annual mortality, including species composition and spatial differentiation. Monitoring plans would be designed to account for seasonal differences and fatality events of rare species. The WEAP would be provided on a regular basis during operation to ensure the continued ecological awareness during all phases of the Project's life and would incorporate adaptive management protocols for addressing ecological changes over the life of the Project, should they occur.

Decommissioning Impacts

Decommissioning and site rehabilitation would occur at the end of the life of the Project and would result in short-term adverse effects to wildlife and habitats within and adjacent the Project site. Decommissioning is anticipated to only directly affect habitat that was previously disturbed during the Project construction and operation maintenance phases. Temporary disturbances to wildlife from noise, dust and dust suppression, ground vibrations, and human and vehicle presence associated with decommissioning would be comparable to those experienced during construction. The use of heavy equipment and other activities associated with decommissioning of the Project would result in impacts to wildlife similar to those described above for construction.

Following decommissioning activities and removal of the perimeter fence, wildlife species would be able to access and move through the Project area. However, desert ecosystems can take from 70 to over 200 years to recover from disturbance (Abella 2010), and long-term habitat quality would be degraded, which could continue to have adverse impacts on wildlife populations and adjacent habitat. Vegetation would be slow to recover across the site, even with restoration techniques, and lower perennial and annual plant diversity is anticipated wherever soil disturbance occurs during construction and operation and maintenance. Arid and semi-arid ecosystems are particularly vulnerable to degradation and long-term loss of productivity due to characteristics such as fragile soils, naturally low perennial vegetation cover, and limited and variable precipitation.

Implementation of Solar PEIS PDF ER4-1 would require reclamation and restoration of disturbed areas to begin immediately upon decommissioning to minimize the magnitude of ecological resources affected by the construction and operation and maintenance of the Project. These actions include erosion control, native species revegetation, and invasive species control, among others, as described in the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan. Restoration would set the Project site on a trajectory to regain some percentage of native species cover and habitat function; however, restoration is a long, slow process in desert environments, and it would likely take several decades or longer before the site becomes functioning habitat again (Abella 2010; Lovich and Ennen 2011). Restoration of the Project site to functional habitat would be much quicker in areas where limited overland travel was utilized since much of the native vegetation would remain in place. Some vegetation may be crushed during facility removal, similar to the impact described for construction, but is expected to rebound within a few years. Areas where vegetation was trimmed with limited soil disturbance would also be able to recover more quickly than areas subject to soil disturbance, such as grading and leveling, which are anticipated to take up to a century or longer to see habitat restoration. Even with PDFs and a Site Restoration-Revegetation & Decommissioning-Reclamation Plan, the overall impacts to wildlife from decommissioning the Project would remain adverse.

Decommissioning would result in similar short-term, adverse effects to those described for construction. Temporary disturbances to wildlife, including migratory birds and other special status species, from noise, dust and dust suppression, ground vibrations, and human and vehicle presence associated with decommissioning would be similar to those resulting from construction of the Project. The use of heavy equipment and other activities associated with decommissioning of the Project could crush individuals and result in injury or mortality. For migratory birds, impacts could include nest abandonment, nest destruction, loss of chicks or eggs, visual and aural disturbance, and habitat avoidance by special status species that still inhabit the Project site. These impacts would be minimized by implementation of the MMs and PDFs discussed for construction.

The future removal of Project infrastructure, the revegetation of disturbed areas, and the absence of a continual operation and maintenance presence would likely result in an increase of foraging and nesting habitat for special status species and the elimination of potential collision hazards. Movement patterns through the Project site would be restored with the removal of perimeter fencing. While rehabilitation of native vegetation would be implemented with a Site Restoration-Revegetation & Decommissioning-Reclamation Plan, it would take several decades or longer following completion of the ROW period before the site becomes functioning habitat again.

Cumulative Impacts

There are a number of projects and other management actions in the region that would contribute to cumulative impacts to wildlife, including one existing and seven proposed utility-scale solar projects and associated transmission lines located on nearby BLM lands. Other types of cumulative projects include roadway improvements and the construction of transmission infrastructure and a training facility. Based on available acreages, development of the other solar projects, including one already under construction (Yellow Pine Solar), would result in the loss of more than 31,340 acres of native habitat in the Pahrump Valley, of the approximately 435,655 acres of lower elevation habitat in the Pahrump Valley (Section 3.16). Including private land holdings, there would be potential impacts to over 123,239 acres of the 435,655 lower Pahrump Valley (Section 3.16).

Most of the projects considered for cumulative effects would involve ground disturbance and vegetation removal, resulting in the loss of habitat in the Mojave Desert region. Additionally, while not all private lands in the Pahrump Valley have planned development, private lands cannot be used for long-term vegetation connectivity planning as no single public agency or plan governs development. Table 3.16-6 and Table 3.16-7 identify the maximum impact potential on Pahrump Valley Vegetation communities in both Nevada and California. The vegetation communities are habitat for wildlife species. Table 3.16-8 provides the cumulative disturbance acreages for the Proposed Action and solar projects by disturbance type.

Similar to the Proposed Action, these cumulative projects would also likely result in the proliferation of invasive species and fugitive dust in the area. Also, increased fire frequency or intensity resulting from a combination of abundant invasive plant fuels and higher likelihood of anthropogenic ignitions could have potentially severe ecosystem effects, adversely affecting sensitive plant communities and wildlife (Abella, Gentilcore and Chiquoine 2021, Chambers, Brooks, et al. 2013, Grodsky, Tanner and Hernandez 2020). Transportation projects along SR 160, including a recent widening of SR 160 completed in 2020 as well as proposed future road improvements and a bypass project, are also a source of past and future impacts to wildlife.

Construction and operation of the cumulative projects considered could directly harm, cause avoidance or changes in behavior, or cause mortality of wildlife. Direct and indirect cumulative effects on wildlife could occur from herbicide use, dust and dust suppression, noise, lighting, spread of invasive species resulting in reduction in habitat quality, and other changes in the area. Security fencing around the perimeter of other solar project sites would be similar to that of the Project and would result in large-scale movement barriers for many species across the region. The BLM would require other solar projects to lift all internal fences, similar to the Proposed Action, and provide openings in perimeter security fences to allow for some movement of wildlife through the area; however, species too large to fit through the passages would be excluded for the duration of the projects. Large-scale solar installations in the region would also contribute to increased risk of collisions with panels, overhead lines, or other infrastructure for wildlife, particularly birds and bats, as well as disorientation or disruptions to foraging and migration.

Many of the other cumulative projects would affect the same types of Mojave Desert habitat within the region, see Table 3.16-8, which would likely impact many of the same species that would be affected by the Proposed Action. Proposed solar projects would result in a long-term loss of thousands of acres of vegetation, resulting in large-scale habitat loss and fragmentation for a variety of wildlife in the Pahrump Valley. For the purposes of analysis, it is assumed that the proposed construction methods for other projects would be similar to those for the Proposed Action (primarily drive and crush [D-2] and clear and cut with soil removal [D-3] disturbance levels), which would result in mostly long-term and/or permanent impacts to existing habitat. Mojave Desert plant communities provide habitat for numerous species, most of which depend on large home ranges for survival since vital resources in the desert can be scarce. Vegetation would be removed to allow for installation of various facilities, and large areas would also require ground disturbance such as grading that would result in permanent loss of native vegetation in those areas. This cumulative vegetation loss and an increased risk of invasive species spread with associated increased fire risk would result in substantial adverse effects to these resources throughout the Pahrump Valley, resulting in reduced quality of wildlife habitat and lowered overall resilience to future disturbances such as climate change.

The Proposed Action would result in direct and indirect effects to wildlife that would be similar to the effects caused by the other large-scale solar projects in the region and would contribute to the cumulative adverse effects on wildlife populations and habitat in the analysis area. Because construction and operation of other projects are proposed to overlap in time and would be built out across large areas of habitat adjacent the Project site, there would be cumulative adverse effects on wildlife that inhabit or migrate through the Pahrump Valley including increased risk of collisions, 31,465 acres of habitat disturbance, fugitive dust, degradation of habitat quality from invasive species, fragmentation of habitat and movement corridors from permanent security fencing, and increased anthropogenic disturbances such as noise, vibration, and lighting. . With such large areas covered by solar panel arrays, there could be cumulative adverse effects to migrating birds due to increased risk for collisions with solar panels and other facility infrastructure. Development of other solar projects would also entail associated transmission lines, which could significantly increase risks of electrocution. Current understanding of the regional impacts of utility-scale solar facilities on wildlife is limited despite the pace and scale of development (Chock, et al. 2021; Kosciuch, Riser-Espinoza and Moqtaderi, et al. 2021). However, large-scale habitat loss and fragmentation is known to result in barriers to movement and gene flow and can have the potential to result in population-level impacts. Also, solar developments are known causes of avian mortality, and fatalities could be compounded at this scale. Implementation of Solar PEIS PDFs and required plans and mitigation measures to protect wildlife, migratory birds, and habitat would reduce the Project's contribution to the cumulative adverse impacts, but many long-term adverse impacts would be unavoidable.

3.4.6 Alternative 1 – Resources Integration Alternative

Construction Impacts

Alternative 1 would require that grading be kept to 20 to 21 percent of the development area, which would allow for approximately 406 acres of grading (D-3). This would mean a reduction of grading by 243 acres (approximately 37 percent) compared to the Proposed Action, a decrease from 1,301 to 617 acres (approximately 52 percent reduction) of development using the drive and crush (D-2), and an increase in 926 acres of development using overland travel method (D-1). Within construction areas for the solar panel arrays, this alternative would require that topography, soils, and vegetation be left in place and that the installation of solar array components would occur over these existing resources. The maximum disturbance threshold to perennial vegetation would be 40 percent of the total area not graded for each panel array block (drive and crush, D-2), resulting in a minimum of 60 percent of native vegetation communities preserved within the 895 acres proposed for overland travel. If spot grading or leveling is needed within the block, that area would be counted towards the maximum disturbance threshold for grading. Areas proposed for avoidance, which include major ephemeral drainages, would remain the same (approximately 568 acres). All other Project components would remain the same.

Vegetation that is not subject to grading, crushing, or other disturbances would be trimmed by hand if its height would interfere with facility operations or create a fire risk. Trimming would reduce the height of vegetation to below the level of interference and to no less than 18 inches. Trimming would result in an overall reduction in remaining post-construction vegetative cover. Additionally, ground disturbance associated with trimming may result in additional crushing of vegetation and some loss of habitat function. Determinations for trimming would be made on an individual solar array basis so that there would be no mass trimming actions on large areas of vegetation.

With the reduction in areas to be permanently impacted through grading and a minimum threshold set for native perennial vegetation loss, Alternative 1 would result in reduced impacts to wildlife and habitat within the Project site. While the Project components would remain the same, this reduction in permanent disturbance areas would allow for more areas of native habitat to remain following construction and would allow for quicker recovery from disturbance in those areas compared to if they were graded or lost due to clearing. Larger areas of native plant communities preserved and reduced areas of heavy soil disturbance would likely result in reduced invasive species infestations and loss of the soil seed bank. Natural plant recruitment would be likely to occur in areas with limited disturbance. The duration of disturbance to wildlife from construction activities (e.g., as noise, dust, human presence, potential for harm due to equipment and vehicle use), would likely be the same as that for the Proposed Action, but the intensity and spatial scale would be reduced due to smaller areas of vegetation removal and ground disturbance.

This alternative would reduce the overall adverse impacts to wildlife but would not eliminate them. All Solar PEIS PDFs and plans required by the BLM for mitigating negative impacts to wildlife from construction of the Project would remain the same as those for the Proposed Action except for WILD-1, which is not required because Alternative 1 already incorporates this element.

Operation and Maintenance Impacts

During the 30-year Project lifespan vegetation would be maintained throughout 60 percent of the site that would provide wildlife habitat during this period. Vegetation would be trimmed as needed to prevent interference or safety issues with the solar facilities, which would reduce cover and forage opportunities. However, compared with the Proposed Action, the Resources Integration Alternative is expected to result in perennial plant survival, allowing for more areas of usable habitat. While there is some concern that preserving more areas of habitat could increase the potential for wildlife to experience harm from the solar facility, such as collisions with equipment or disturbance during maintenance activities, the benefits of long-term habitat preservation and reduced fragmentation that would extend beyond the Project lifespan outweigh the risks. Reduced disturbance areas would require less dust abatement and herbicide use, and Solar PEIS PDFs for the protection of wildlife would be adhered to. These include PDF ER 3-2, which requires the developer to manage projects to minimize impacts to wildlife during operation and maintenance of the Project, employing an adaptive management strategy as necessary and approved by the BLM.

Decommissioning Impacts

Decommissioning under the Resources Integration Alternative is anticipated to affect areas previously disturbed during Project construction. Decommissioning would result in direct and indirect impacts to wildlife similar to those described for construction for this alternative. With less impactful construction methods, vegetation communities would recover more quickly than for the Proposed Action, and it is anticipated that habitat would be largely intact during the operation of the facility. Native seed banks and soils would be maintained over most of the Project site.

Following the Project's 30-year lifespan, decommissioning and site restoration would be more successful due to fewer areas of permanent disturbance (D-3) as compared to the Proposed Action. Since vegetation would be maintained on the site throughout the life of Project, it is expected that the habitat within the Project area would recover more easily after decommissioning and require less effort to restore than under the Proposed Action, and intensive restoration would likely be needed only in graded areas. This would result in less stress on adjacent lands for wildland seed collections to restore the site. It is expected that the site would recover more quickly, allowing for restoration of important Mojave Desert habitats within the area within 5 to 10 years after decommissioning as opposed to centuries for a full recovery compared with the Proposed Action (Abella 2010; Chambers et al. 2013; Hernandez et al. 2014; Lovich and Bainbridge 1999). The long-term impacts to wildlife habitat would be substantially reduced.

Implementation of the Site Restoration-Revegetation & Decommissioning-Reclamation Plan, Solar PEIS PDFs, and SNDO-required PDFs as described for the Proposed Action would reduce potential adverse effects on vegetation during decommissioning. Restoration under the Resources Integration Alternative would be achieved much more quickly than under the Proposed Action.

Cumulative Impacts

A key assumption of the resources integration cumulative scenario is that cumulative solar projects in the Nevada portion of the Pahrump Valley would incorporate similar construction techniques to those described under the Resources Integration Alternative – Alternative 1 (Section 2.5.1 in Chapter 2). It does not assume similar construction techniques for projects in California as they are governed by a different management plan and under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. Table 3.16-8 provides the cumulative disturbance acreages for the Resources Integration Alternative cumulative scenario by disturbance type. As noted in Table 3.16-8, over 10,000 acres of habitat within the total 31,465 acres covered by potential solar projects would either be avoided entirely or built using the overland travel technique which would retain the vegetation and habitat in those areas.

Implementation of the Resources Integration Alternative on other solar developments in the Nevada portion of the Pahrump Valley would reduce cumulative impacts to wildlife across the region based on a reduction of grading acres. Less impactful construction techniques and retention of vegetation during operation of the projects would result in higher vegetation survival and plant diversity, providing higher quality wildlife habitat within the development areas. Reduced ground disturbance would promote quicker recovery compared to grading or repeated crushing, and natural plant recruitment would be more likely to occur in areas with limited disturbance. Limiting grading to 20 to 21.5 percent of the area would result in fewer disturbances to burrowing animals, and retention of perennial vegetation across 60 percent of the development areas would reduce impacts to nesting and foraging habitat. Reduced soil disturbance would lead to less fugitive dust generated by construction and operation of the projects, and with larger areas of intact vegetation and soils there would be a reduced likelihood of invasive species infestations (Chambers et al. 2014; Copeland et al. 2017; Grodsky and Hernandez 2020; Kobelt 2020; Lovich and Ennen 2011). This would reduce the overall amount of herbicides needed to control weeds, which would limit the amount of exposure to these substances for wildlife in the area.

The Resources Integration Alternative would still have impacts, but cumulative impacts, especially if this alternative is implemented across the Pahrump Valley, would be reduced because there would be an overall reduction in 11,900 acres of grading, resulting in reduced vegetation and habitat removal. Since the anticipated recovery time post-Project is expected to be much less for the Resources Integration Alternative than for the Proposed Action (5–10 years, as opposed to hundreds of years [see Tables 3.16-4 and 3.16-5 for more information]), there would be fewer cumulative impacts to the area, and specifically wildlife habitat, over time. Retaining vegetation also improves habitat resiliency for adapting to climate change impacts as compared to the Proposed Action.

3.4.7 No Action Alternative

Under the No Action Alternative, the Rough Hat Clark Solar Project would not be constructed, and existing land uses would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP. There would be no impacts to wildlife from Project implementation, and existing habitat conditions and trends would remain.

3.4.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are summarized in Appendix B. The Project would comply with the following Solar PEIS PDFs and mitigation measures to minimize adverse impacts to wildlife, migratory, birds and other special status species:

Solar PEIS Programmatic Design Features

- General
  - ER1-1: Project developers shall consult with the BLM and other federal, state, and local agencies in the early phases of project planning to help ensure compliance with federal regulations that address the protection of fish, wildlife, and plant resources, with appropriate federal, state, and local agencies.SR1-1: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the project planning process to assess soil erosion and geologic hazard concerns and to minimize potential impacts.
  - HMW1-1: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the planning process to assess hazardous material and waste concerns and to minimize potential impacts.
- Site Characterization, Siting and Design, Construction
  - ER2-1: Solar facilities shall be sited and designed, and constructed to avoid, minimize, or mitigate impacts on ecological resources.
  - SR2-1: Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.
  - AQC2-1: Solar facilities shall be sited and designed, and constructed to minimize impacts on air quality.
  - VR2-2: Solar facilities shall be sited and designed to minimize night-sky effects.
  - HMW2-1: Solar facilities shall be characterized, sited and designed, and constructed to minimize hazardous materials and waste management design elements.
- Operation and Maintenance
  - ER3-1: The developer shall manage vegetation utilizing the principles of integrated pest management, including biological controls to prevent the spread of invasive

species, per the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, and the National Invasive Species Management Plan, 2009* and the *Final Programmatic Environmental Impact Statement for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States, 2016*. Consultation with the BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.

  - ER3-2: The developer shall, in consultation with the BLM and appropriate federal, state, and local agencies, manage projects so as to minimize impacts on ecological resources during operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
  - SR3-1: Compliance with the conditions for soil resources and geologic hazards shall be monitored by the project developer. Consultation with the BLM shall be maintained through the operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
  - SR3-2: Permanent stabilization of disturbed areas shall occur during final grading and landscaping of the site and be maintained through the life of the facility.
- Reclamation and Decommissioning
  - ER4-1: Reclamation of the construction and project site shall begin immediately after decommissioning to reduce the likelihood of ecological resource impacts in disturbed areas as quickly as possible.
  - SR4-1: All design features for soil erosion and geologic hazards developed for the construction phase shall be applied to similar activities undertaken during the decommissioning and reclamation phase.
  - SR4-2: To the extent possible, the original grade and drainage pattern shall be re-established.
  - SR4-3: Native plant communities in disturbed areas shall be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of recommendations by the BLM, once decommissioning is completed.

Southern Nevada District Office Project Design Features

- Gen-1: Specifies desert tortoise and security fencing details.
- Veg-1: Vegetation disturbance will be minimized to the maximum extent possible.
- Wild-2: Do not feed wildlife.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Dust Abatement Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- Integrated Weed Management Plan
- Bird and Bat Conservation Strategy Plan
- Fencing Plan (Desert Tortoise Exclusion and Security)
- Nuisance Animal and Pest Control Plan

- Technical Drainage Plan
- Lighting Plan
- SNDO Raven Management Plan
- Southern Nevada Nesting Bird Management Plan
- Worker Environmental Awareness Plan
- Spill Prevention, Control, and Countermeasures Plan
- Fire Management Plan
- Hazardous Materials and Waste Management Plan
- Trash Abatement Plan
- MM WILD-1: Reduced Project Footprint: During preparation of the final Plan of Development, the Applicant shall coordinate with the BLM to minimize the amount of ground disturbance needed to effectively construct and operate the facility. All disturbance areas shall be refined and designed to the minimum size needed to safely operate the facility, including access roads. Justifications for disturbances, such as access road widths, substrates, locations, and frequency, shall be provided upon BLM request during review of the revised footprint.
- MM WILD-2: Pre Construction Western Monarch Butterfly Surveys

  The following measures will be implemented, as modified from the US Fish and Wildlife Service's 2023 Western Monarch Butterfly Conservation Recommendations, to protect western monarch butterfly:
  - A BLM-approved Project botanists will be on site during construction to lead pre-disturbance surveys for milkweed within the Project site areas of disturbance and areas within a 40 foot buffer of disturbance and will provide guidance to botanical biological monitors in assisting with those surveys, if ground disturbance is ongoing during December 1 - March 15 (botanists may have multiple roles - for instance, could conduct weed surveillance and also milkweed surveys). Surveys can be conducted concurrently with weed surveillance surveys. Additionally, botanical biological monitors will be trained to identify milkweed and record its location(s) for confirmation by the BLM-approved Project botanist during the course of their site activities.
  - Any milkweed will be flagged and locations of the plants will be submitted to the iNaturalist data portal (https://www.inaturalist.org/projects/western-monarch-milkweed-mapper), and geospatial data for these plants will also be submitted to the BLM by March 30 annually. If no plants are found during surveys, this information will also be submitted to the BLM by March 30 with a full report of survey efforts for the season.
  - If milkweed plants are observed or suspected to be occupied by immature monarch butterflies, the plants will be flagged for avoidance until the individuals emerge from the chrysalis or are determined to have failed.
  - Where possible, if located, milkweed plants will be avoided during construction.
  - If milkweed is identified and where herbicides are used for invasive plant management, buffers will be established around the milkweed (40 feet minimum), in coordination with BLM.
- MM PS-3: Fire Prevention and Safety Plan (see Section 3.9)

3.4.9 Irreversible and Irretrievable Impacts

Irreversible or irretrievable impacts are those that cannot be reversed or recovered. Implementation of the Proposed Action would result in irreversible or irretrievable impacts on up to 1,950 acres of wildlife habitat across the development area. The Proposed Action would result in the permanent loss of habitat on 649 acres due to grading (D-3), with additional loss and degradation of habitat across the remaining 1,301 acres where drive and crush (D-2) would be used for the construction method. The loss of wildlife habitat would result in a loss of shelter, nesting habitat, and foraging sources for wildlife species and would result in the affected wildlife having to rely more heavily on habitat outside of the Project footprint. Site reclamation, even with substantial effort, is not expected to restore these impacted areas to pre-Project conditions. Restoration could take decades (D-2) to centuries (D-3) on a project of this size (especially in an arid environment), and repeated restoration efforts would be necessary. Many species, such as cacti and yucca, would not be expected to recolonize the site, and changes to native species composition would be permanent. Indirect impacts from the Project (e.g., fugitive dust, spread of invasive weed species) would persist beyond the 30-year ROW period. Permanent adverse impacts to wildlife habitat would remain with the construction techniques identified in the Proposed Action even with the identified mitigation measures.

The Resources Integration Alternative would result in irreversible or irretrievable impacts, with the permanent loss of habitat where the site is graded (D-3), approximately 373 to 401 acres, and on up to 40 percent of non-graded areas (617 acres). This alternative would not result in irreversible or irretrievable impacts to 60 percent of the site (926acres) where perennial vegetation would be maintained throughout the life of the Project. Where ground disturbance is avoided or kept to a minimum, vegetation would be trimmed as needed and surface soils and local drainages would be left undisturbed. In these areas, impacts are expected to be temporary and not irreversible.

3.5 Biological Resources – Threatened and Endangered Species

3.5.1 Introduction

This section identifies federally threatened and endangered wildlife species that are known to occur or could occur within the Pahrump Valley and that could be affected by Project construction, operation and maintenance, and decommissioning. The BLM's Threatened and Endangered Species Program manages all threatened and endangered species on BLM-administered lands under the Endangered Species Act (ESA). Whenever the BLM is considering an action that may affect a federally listed or proposed species or its critical habitat, the BLM undertakes ESA Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) to ensure that the action does not jeopardize the continued existence of any listed species or adversely modify designated critical habitats.

The BLM is required under the ESA to protect and restore the habitats upon which listed species depend and to take actions that will foster recovery of listed species. The program's priority is to recover federally listed species so that protection under the ESA is no longer required and to implement conservation efforts for BLM sensitive plants and federal candidate species to preclude the need for listing. The BLM manages threatened and endangered species in accordance with the 1998 Las Vegas RMP, as amended, BLM Manual 6500 Fish and Wildlife Conservation, and BLM Manual 6840 Special Status Species Management.

Federally listed species are currently managed in accordance with USFWS recovery plans or conservation agreements under the ESA, which prohibits actions that result in the take of listed species without a permit. 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 threatened and endangered species are provided in Appendix E.

3.5.2 Analysis Area

The analysis area for threatened and endangered species includes the Project site, regional migration and connectivity corridors within the greater Pahrump Valley and adjacent mountain ranges, and the Mojave desert tortoise translocation areas discussed under the alternatives.

For cumulative effects, the analysis area includes projects in the Pahrump Valley and adjacent contiguous areas. Other projects or management actions within this area would be expected to affect similar vegetation, habitat, and wildlife. This area 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.

3.5.3 Affected Environment

The only federally threatened, endangered, or proposed species known to occupy habitat within the Project site is the Mojave desert tortoise (*Gopherus agassizii*). Two federally endangered bird species, the Yuma Ridgway's rail (*Rallus obsoletus yumanensis*) and southwestern willow flycatcher (*Empidonax traillii extimus*), and the federally threatened western yellow-billed cuckoo (*Coccyzus americanus*), may migrate through the area and could be affected by the Project but do not occupy habitat found within the Project site or analysis area.

Mojave Desert Tortoise

The Mojave desert tortoise is a large, herbivorous reptile that occurs in the Mojave Desert north and west of the Colorado River in southwestern Utah, southern Nevada, southeastern California, and northwestern Arizona. It is protected under the ESA and by the state of Nevada and is considered a sensitive species by the BLM. The species was listed as threatened under the ESA on April 2, 1990. A Recovery Plan was published in 1994 together with a supplement identifying proposed Desert Wildlife Management Areas (DWMAs) (U.S. Fish and Wildlife Service 1994). The Recovery Plan was revised in 2011 to address the need for understanding synergistic effects of threats to the species and to resolve key uncertainties regarding management.

Threats to Mojave desert tortoise include habitat destruction and fragmentation from development (including solar power generation facilities), highways, uncontrolled OHV use, natural resource extraction, and invasive species (Defenders of Wildlife, Desert Tortoise Preserve Committee, and Desert Tortoise Council 2020). Climate change has been exacerbating these impacts and increasing pressure on limited resources. Recent trends of decreasing precipitation, changing frequency of intense storms and related flood events, increased occurrence of wildfires, and persistent drought have been occurring across the region. Most threats to the Mojave desert tortoise or its habitat are associated with human land uses; however, very little is known about the specific demographic impacts on tortoise populations or the relative contributions each threat makes to tortoise mortality (U.S. Fish and Wildlife Service 2011)(Allison and McLuckie 2018). The Project site is located within the Eastern Mojave Recovery Unit (U.S. Fish and Wildlife Service 1994; U.S. Fish and Wildlife Service 2011) though it does not overlap any critical habitat units or BLM Areas of Critical Environmental Concern (ACECs) designated for desert tortoise. The nearest critical habitat unit, Ivanpah, is located approximately 30 miles to the south of the Project site. Of the six recovery units, the Eastern Mojave has experienced the greatest loss in abundance of Mojave desert tortoise, with a trend of 11.2-percent annual reduction from 2004 to 2014 (U.S. Fish and Wildlife Service (USFWS) 2020; Allison and McLuckie 2018) (U.S. Fish and Wildlife Service 2022). The Project is also within a Priority 2 Connectivity Area identified by the USFWS, which is an area of contiguous, high-quality habitat that provides connectivity for desert tortoise populations with densities that are higher than expected for the Eastern Recovery Unit (see Figure 3.5-1 in Appendix D).

NewFields conducted Mojave desert tortoise surveys for the entire Project site (study area) in 2021 in accordance with 2018 USFWS protocol (NewFields 2021; U.S. Fish and Wildlife Service 2018). The objective of the field survey was to determine presence or absence of Mojave desert tortoise, estimate the number of tortoises (abundance), and assess the distribution of tortoises. Data collected within the Project site was analyzed using the USFWS 2018 protocol equation to determine the estimated number of Mojave desert tortoises within the area. This method utilizes the number of individuals observed above ground, the probability that an individual is above ground, the probability of detecting an individual if above ground, and the size of the area surveyed (U.S. Fish and Wildlife Service 2018).

Fifty-seven live Mojave desert tortoises were encountered during the surveys, 52 of which met the USFWS criteria to be included in a population estimate (adults greater than 180 mm in mean carapace length) (NewFields 2021). These observations were distributed relatively uniformly across the Project site (Figure 3.5-2 in Appendix D). The estimated number of adult Mojave desert tortoises within the Project site is 114 (approximately 0.05 adult tortoises per acre). Due to low winter precipitation, the estimated number of tortoises was calculated using a lower probability of tortoises being detected above ground than what would be expected during a year with normal precipitation. Desert tortoise sign was also recorded, including burrows, pallets (shallow depressions dug for resting), carcasses, and scat, which was also distributed fairly equally throughout the study area. The Mojave desert tortoise density estimated from survey results suggests that the population levels in the Project site are higher than would be expected based on the 2011 USFWS findings (UES 2023; USFWS 2011). Due to the equal distribution of observations of live Mojave desert tortoise and their sign across the study area, the entire site is assumed to be suitable and occupied habitat.

Table 3.5-1 Desert Tortoise Population Estimates in the Study Area

Size class	Number detected during surveys	Estimated total in study area
Adult (≥ 180 mm in mean carapace length)	52	114
Juvenile (< 180 mm in mean carapace length)	5	—*
* Juveniles are not included in population estimate equations.		

Source: (NewFields 2021)

Yuma Ridgway's Rail

The Yuma Ridgway's rail (*Rallus obsoletus yumanensis*), also known as Yuma clapper rail, is a federally listed endangered water bird endemic to the lower Colorado River, the Salton Sea in California, the Ciénega de Santa Clara in Mexico, and the Gila River in Arizona. It was listed under the ESA in 1967. The virtual elimination of freshwater flows down the lower Colorado River to the delta due to diversions from the river for agriculture and municipal uses has significantly reduced habitat for this species. Existing habitats are primarily either human-made, such as managed ponds at Salton Sea, or formed behind dams and diversions. The greatest threat to the Yuma Ridgway's rail is loss of habitat from water diversion and disruptions to natural hydrologic processes (U.S. Fish and Wildlife Service 1983). Other threats to this species include continuing land use changes in floodplains, human activities, environmental contaminants (particularly increases in selenium levels), and reductions in connectivity between core habitat areas (U.S. Fish and Wildlife Service 1983). While the Project site does not support habitat for this species, it is known to inhabit freshwater marshes in Ash Meadows National Wildlife Refuge (NWR), approximately 30 miles to the northwest of the Project site.

This species has generally been considered non-migratory based on earlier telemetry studies from the 1980s, which documented rails that maintained small annual home ranges and rarely left their breeding areas (Eddleman 1989; Conway 1990; Conway, Anderson and Hanebury 1993). However, incidental mortalities of Yuma Ridgway's rails at solar facilities in desert environments far from wetlands (Kagan et al 2014) and recent studies documenting migration patterns (Harrity and Conway 2020) suggest that these rails leave their breeding marsh habitats more than previously thought. Roughly 40 percent of rails tracked with transmitters in a study between 2017 and 2019 migrated long distances to reach wintering territories (Harrity and Conway 2020); however, the presence of scattered habitat patches for resting is likely important. While the Project site does not contain any suitable habitat for this species, Yuma Ridgway's rails could migrate through the Pahrump Valley during annual migrations.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) breeds in dense riparian habitats in southwestern North America and winters in southern Mexico, Central America, and northern South America. Its breeding range includes far western Texas, New Mexico, Arizona, southern California, southern portions of Nevada and Utah, southwestern Colorado, and possibly extreme northern portions of the Mexican States of Baja California del Norte, Sonora, and Chihuahua (U.S. Fish and Wildlife Service 2002). The subspecies was listed under the ESA as endangered in 1995. It is found in relatively dense riparian tree and shrub communities associated with rivers, swamps, and other wetlands, including lakes and reservoirs. Habitat requirements for wintering are not well known but include brushy savanna edges, second growth, shrubby clearings and pastures, and woodlands near water. Critical habitat was designated in 2013 (U.S. Fish and Wildlife Service 2013), including portions of Ash Meadows NWR, which is approximately 30 miles to the northwest of the Project site, see Figure 3.5-3 in Appendix D. While the Project site does not contain any suitable habitat for this species, southwestern willow flycatcher could migrate through the Pahrump Valley during annual migrations.

The southwestern willow flycatcher has experienced extensive loss and modification of breeding habitat, with consequent reductions in population levels. Destruction and modification of riparian habitats have been caused mainly by surface water diversion and groundwater pumping, changes in flood regimes due to dams and stream channelization, livestock grazing, and establishment of invasive non-native plants (U.S. Fish and Wildlife Service 2002). Concurrent with habitat loss has been an increase in brood parasitism by the brown-headed cowbird (*Molothrus ater*), which inhibits reproductive success and further reduces population levels.

Western Yellow-billed cuckoo

The western yellow-billed cuckoo (*Coccyzus americanus*) is a migratory bird species, traveling between its breeding grounds in North America (Continental United States and Mexico) and its wintering grounds in Central and South America each spring and fall, often using river corridors as travel routes (Johnson, et al. 2008, USFWS 2014). On October 3, 2014, the USFWS published a final rule (79 FR 59991) listing the western Distinct Population Segment (DPS) of the yellow-billed cuckoo as threatened under the ESA. Western DPS yellow-billed cuckoos have historically bred in riparian areas across most of North America, from southeastern and western Canada throughout the continental United States to northern Mexico (Johnson, et al. 2008). Although population trend data is generally lacking, rough extrapolations of historic and current information suggest that the yellow-billed cuckoo's habitat distribution, range, and population numbers have declined substantially across much of the western United States over the past 50 years (USFWS 2014). It is now only known to breed in isolated locations in Idaho, Wyoming, Colorado, Utah, Arizona, Nevada, California, and Sonora and Chihuahua in northern Mexico (USFWS 2021, Johnson, et al. 2008).

Western yellow-billed cuckoos require structurally complex riparian vegetation with tall trees and a dense woody understory. They breed in large blocks of riparian vegetation, particularly in woodlands with cottonwoods and willows, usually not far from sources of water such as rivers, lakes, reservoirs, and wetlands. Habitat requirements for wintering are not well known but include brushy savanna edges, shrubby clearings and pastures, and woodlands near water. Critical habitat was designated in 2021 but does not include Nevada (USFWS 2021). The western yellow-billed cuckoo is known to migrate to Ash Meadows NWR to breed (USFWS 2011), which is approximately 30 miles to the northwest of the Project site. While the Project site does not contain any suitable habitat for this species, western yellow-billed cuckoos could migrate through the Pahrump Valley during annual migrations.

3.5.4 Environmental Consequences

Methodology

The BLM identified species for analysis based on the USFWS Information for Planning and Consultation (IPaC) system (U.S. Fish and Wildlife Service 2022) and through coordination with USFWS regarding species known or suspected to be present in the analysis area.

Focused biological surveys for Mojave desert tortoise were conducted in May 2021. Detailed descriptions and results of the focused biological surveys conducted for the Mojave desert tortoise are found in the *Desert Tortoise Presence/Absence Report* for Rough Hat Clark Solar Project (NewFields 2021). Data from BLM avian acoustical monitoring stations in the Pahrump Valley were used for bird species likely to occur along with avian surveys performed for the Rough Hat Clark Solar Project area through December 2022 (Heritage Environmental Consultants 2023).

Direct effects to threatened and endangered wildlife include actions that cause disturbance from noise, harassment, entrapment, injury, and mortality as well as changes in habitat use or behavior such as movement, foraging, or breeding. Indirect effects could occur through changes in the characteristics or quality of habitat and include habitat loss, degradation, or modification.

Effects to threatened and endangered wildlife would be short-term, long-term, and permanent. Short-term effects would be associated with Project construction and would not be expected to persist past 5 years following completion of the construction and restoration of temporary use areas. Long-term effects would be expected during operation and maintenance activities for the 30-year duration of the Project, and permanent effects would be expected in areas of complete removal of native habitats (refer to Section 3.16: Vegetation, Special Status Plants, and Noxious Weeds). This timeframe reflects the slow recovery rates of plant communities in desert ecosystems, which could take a century or longer to fully recover, if they do at all (Devitt et al. 2022). Long-term effects to special status species beyond 30 years become increasingly difficult to predict due to the many unknown trophic interactions and environmental variables that may occur.

3.5.5 Proposed Action

The majority of impacts to threatened and endangered species associated with the Proposed Action would be similar to those described for other wildlife (refer to Section 3.4: Biological Resources Wildlife, Migratory Birds, and Other Special Status Wildlife). Where impacts may be more specific to individual threatened and endangered species, they are discussed in more detail below.

Construction Impacts

Mojave Desert Tortoise

Direct effects on Mojave desert tortoises within the Project site would occur during Project construction. Direct effects include the displacement of up to the estimated 114 adult individuals expected to be found on the Project site prior to construction and the permanent loss of Mojave desert tortoise habitat for the entire Project site. The site would exclude desert tortoise prior to construction. For the duration of the Project, tortoise surveys and translocation would occur in accordance with the BLM and USFWS-approved Translocation Plan for the Stump Springs Regional Augmentation site (Clark County, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Geological Survey 2022). This translocation plan was developed for the regional translocation of tortoises to Stump Springs and contains requirements for proper handling of tortoises, health assessments of individual tortoises to prevent the spread of disease, release site considerations (including location and climatic conditions), assessment of habitat quality in translocation areas and management goals for improvements (such as invasive species management and restoration of native species cover), assessment of predation risk and identification of possible measures for reducing raven, badger, and canid predation on tortoises, and post-translocation monitoring that shall be implemented with an adaptive management approach to address issues that arise after translocation (Mack and Berry 2022). Fencing would be constructed around the perimeter of the Project site in accordance with the Desert Tortoise Exclusion Fencing Plan required as part of the BLM ROW Grant and in accordance with SNDO PDF Gen-1 that would be developed and approved prior to issuance of the Notice to Proceed. Tortoise fencing would include tortoise-proof gates or guards with a well-maintained path of escape for tortoises, following USFWS-recommended specifications for desert tortoise exclusion fencing (U.S. Fish and Wildlife Service 2009). Wildlife openings installed in the perimeter fencing will be 5 inches off the ground and intended to continue to exclude them from the Project site. However, because there is a potential for adults to traverse the openings, USFWS fence specifications require shade structures on both the inside and outside of the perimeter fencing.

Some Mojave desert tortoises may remain on site or be located on the areas outside the fenced area, such as the acceleration and deacceleration lanes or at the distribution pole sites, and could be directly affected by Project construction. Potential impacts would include mortality or injury from being crushed by moving vehicles while outside of burrows or being crushed while in burrows during ground disturbance. Construction equipment could also temporarily disturb desert tortoises by creating vibrations, noise, and light pollution. Such disturbance could cause tortoises to temporarily avoid otherwise suitable habitat near the construction activities. Tortoises could also be affected by fugitive dust and hazardous materials generated on site, and construction could also increase the risk of predation by the introduction of perch structures for ravens and raptors, and litter or trash produced at the Project site could attract ravens and coyotes. Vibrations and water from dust control measures could draw tortoises out of their burrows during normal periods of dormancy due to the similarities with rainfall noise, vibrations, and humidity. While there is a potential for some adult desert tortoises to be injured or killed on site, the number is expected to be low. Adult desert tortoises are more easily detected during preconstruction surveys because of their large size, and therefore it is expected that most adult desert tortoises that occur within the construction-phase exclusionary fence would be identified and translocated. Because of the difficulty in locating juvenile desert tortoises and eggs, some may not be found during preconstruction surveys and could be crushed or injured during Project construction.

Solar PEIS PDF ER2-1 requires measures to reduce the attractiveness of solar energy development and infrastructure areas to opportunistic predators. Such measures include litter control programs, raven deterrents, use of hazing, and active monitoring of the site for presence of ravens and other predators. Details of these measures are to be included in a Raven Control Plan required as part of the BLM ROW Grant that will be approved by the BLM prior to construction. A Hazardous Materials and Waste Management Plan required as part of the BLM ROW Grant would be developed to mitigate risks associated with the use and storage of materials that could be hazardous to tortoises, water would be used in accordance with the Dust Abatement Plan, and herbicides would be applied in accordance with the approved Pesticide Use Plan and Integrated Weed Management Plan required as part of the BLM ROW Grant. The WEAP would include information for location and avoidance of desert tortoises, and all occurrences would be reported to USFWS should they be encountered during construction.

Capturing, handling, monitoring, and moving desert tortoises from existing habitat to translocation areas may result in stress, injury, or death (Hinderle 2015, Averill-Murray 2002). While translocation away from the Project site would reduce effects to the desert tortoise from construction activities, there would likely still be injury or mortality to a percentage of those translocated (Mack and Berry 2022). For example, the Stump Springs Regional Augmentation Site proposed for translocated desert tortoises from the Project site has been used recently for the development of the adjacent Yellow Pine Solar Project, and tortoises experienced a high mortality rate following release (Clark County, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Geological Survey 2022). Translocated tortoises often expend more energy exploring and attempting to return to their home ranges, which can lead to several other effects such as increased mortality due to exposure or vehicle collision, lower fitness, and increased mortality and stress due to interactions predators and with resident tortoises in the translocation area (Germano et al. 2015; Mack and Berry 2022). There could also be an increase in mortality and stress to tortoises currently living in the translocation area caused by the introduction of new tortoise individuals since they too could experience increased stress from interactions with foreign tortoises, including introduction of pathogens (Aiello et al. 2014) and competition for resources (Berry 1986).

In accordance with Solar PEIS ER1-1, only approved qualified biologists would be permitted to handle desert tortoise according to specialized protocols approved by the USFWS to minimize the effects from translocations. Additionally, MM WILD-3 requires the flagging and avoidance of desert tortoise burrows during construction activities. A Project-specific Desert Tortoise Translocation Plan would be drafted, tiered from the final BLM and USFWS-approved Translocation Plan for Stump Spring Regional Augmentation Site. Methods to avoid translocation impacts are detailed in the Translocation Plan for Stump Spring Regional Augmentation Site that would be appended to the USFWS Biological Opinion. This translocation plan is being revised with information gained following translocation of tortoises from the Yellow Pine Solar Project and will address issues resulting in high mortality rates of translocated tortoises. Translocation itself does not necessarily cause high mortality. Many factors such as site-specific predator presence, status of drought, habitat quality and site selection contribute to overall success. The translocation process is adaptive, and considering site-specific implications to translocation success and refining details of methodology will continue to contribute to the minimization of mortality when compared to other options. The BLM and USFWS are working to implement adaptive measures to determine predator presence, habitat quality, and other factors in response to mortalities that have occurred at the translocation site.

In addition to the direct effects of construction on Mojave desert tortoise, permanent disturbance to desert tortoise habitat would occur. The magnitude of habitat loss from construction of the Project would be greatest for this species due to the exclusion from the entire Project site. Because desert tortoises occupy large home ranges, the long-term persistence of extensive, unfragmented habitats is essential for the survival of the species. Connectivity for desert tortoise is an important concern, and the loss or fragmentation of habitat places the desert tortoise at increased risk of extirpation. Connectivity corridors were identified for the Solar PEIS based on landscape-scale modeling, which identified the Project site and surrounding areas as Priority 2 connectivity habitat. Some existing desert tortoise fencing already exists in the Pahrump Valley including along the SR 160 and surrounding the Yellow Pine Solar Project and certain other projects. The large scale of the Project combined with the long-term exclusion fencing around the Project site could contribute to large movement barriers for the species and disruptions to desert tortoise population linkages (Averill-Murray et al. 2013). While tortoise fencing would reduce the risk for individuals to move back into the disturbance area, the Proposed Action would further result in the loss of available habitat. In addition to the Translocation Plan for Stump Springs Regional

Augmentation Site required as part of the BLM ROW Grant, the Stump Springs Desert Tortoise Long Term Monitoring Plan is being developed through coordination between the BLM and USFWS to establish a 30-year study to monitor the long-term impacts of translocation on desert tortoises to the Stump Springs Regional Augmentation Site and long-term impacts of habitat loss and fragmentation from implementation of the Project.

The Biological Opinion for the Project determined that implementation of the Proposed Action may affect and is likely to adversely affect the Mojave desert tortoise due to various Project-related impacts. These impacts include habitat loss, the requirement of translocation, and the potential for on-site take during the implementation of construction, operation and maintenance, and decommissioning activities. Desert tortoises require 13 to 20 years to reach sexual maturity and have low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life. These factors make the species vulnerable to impacts from anthropogenic disturbance, habitat degradation, predation, and/or other stressors. Even moderate downward fluctuations in adult survival rates can result in rapid population declines (U.S. Fish and Wildlife Service 1994, U.S. Fish and Wildlife Service 2011) (U.S. Fish and Wildlife Service (USFWS) 2022; U.S. Fish and Wildlife Service 2015). Thus, high survivorship of adult desert tortoises is critical to the species' persistence, and the slow growth rate of populations can leave them susceptible to extirpation events in areas where adult survivorship has been reduced. The displacement of all adult tortoises on the Project site and potential loss of juveniles not detected during surveys, in addition to the loss of habitat, could result in a substantial adverse impact on the species and the local population.

The Project has been designed to reduce potential impacts to Mojave desert tortoise from construction through the implementation of Solar PEIS PDFs, MM WILD-3, and other plans. To reduce impacts associated with translocation, the Project-specific Translocation Plan for Stump Springs Regional Augmentation Site shall address the outstanding data needs for translocation of desert tortoises outside of the area contained within the exclusion fencing and describe the USFWS-approved procedures and protocols for relocation and monitoring, including adaptive management to address issues resulting in high levels of mortality. In addition, the Stump Springs Desert Tortoise Long Term Monitoring Plan shall include a 30-year study to monitor the long-term impacts of translocation on desert tortoises to the Stump Springs Regional Augmentation Site. The BLM is engaged in formal consultation with USFWS under Section 7 of the ESA, during which impacts will be assessed and additional measures identified as necessary to minimize impacts to the Mojave desert tortoise. As noted above, the BLM and USFWS are in the process of developing adaptive measures to address site specific factors that have contributed to mortality at the translocation site. In addition, data from the overall success of translocation and survivability post translocation will be analyzed based upon the seasonality of translocations occurring in the spring and those occurring in the fall. This data may serve to increase the total success and survivability for desert tortoise in future translocation efforts.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo

Construction of the Project could affect migrating Yuma Ridgway's rail, southwestern willow flycatcher, and western yellow-billed cuckoo. While no suitable habitat for these species would be disturbed by construction, individuals that may be migrating through the Pahrump Valley to get to habitat at Ash Meadows NWR could be harmed or disoriented by the Project facilities. Solar developments are known causes of avian mortalities and, when cause of death is determinable, collision with a panel or other solar infrastructure has composed the highest percentage of known causes (Kagan 2014, Kosciuch, Riser-

Espinoza and Gerringer, et al. 2020). As described in Section 3.4: Biological Resources, Wildlife, Migratory Birds, and Other Special Status Wildlife, these species would also be susceptible to electrocution associated with overhead power lines. The Applicant proposes an overhead 230 kV gen-tie line up to approximately 1.5 miles in length. Water used for construction of the Project would be sourced from a different groundwater basin (Pahrump Hydrographic Basin) than Ash Meadows NWR and would not affect wetland and riparian habitat in that area.

Potential impacts would be minimized by implementation of Solar PEIS PDF ER1-1, which requires the Applicant to develop measures to protect migratory birds in coordination with the BLM, USFWS, and NDOW, including a Bird and Bat Conservation Strategy required as part of the BLM ROW Grant approved by the BLM prior to construction. These measures include restrictions on the timing and duration of activities developed in coordination with the agencies to minimize impacts to migrating birds from Project activities. Impacts associated with collision and electrocution would be minimized in accordance with Solar PEIS PDF ER2-1, which requires implementing current guidelines and methodologies in the design of proposed transmission facilities to minimize the potential for avian species to collide with them or be electrocuted. Methods include installing mechanisms such as permanent markers or bird flight diverters to visually warn birds and deterrents on support structures and other facility structures to discourage use for perching or nesting. All overhead power lines would be constructed with avian-safe designs in accordance with Avian Power Line Interaction Committee (APLIC) suggested practices (APLIC 2006) and, to the extent practicable, tall structures would be sited to avoid known flight paths of avian species.

While adverse impacts on Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos could occur from construction of the Project, impacts would be minimized with the implementation of Solar PEIS PDFs ER1-1 and ER2-1, and the Bird and Bat Conservation Strategy Plan. Solar PEIS PDF ER1-1 also requires the WEAP to include information for the identification and protection of threatened and endangered species, which would be provided to all Project personnel prior to entering the worksite. In accordance with Solar PEIS PDF ER2-1, qualified biological monitors would be on site during site preparation and construction periods, and any observations of Yuma Ridgway's rails, southwestern willow flycatchers, or western yellow-billed cuckoos would be reported to the BLM and USFWS. Impacts to these species associated with Project construction are not expected to result in a reduction in population levels; however, harm to individuals could occur.

Operation and Maintenance

Mojave Desert Tortoise

Overall, desert tortoises do not coexist well with human development and disturbances, and would be unlikely to persist in the area following construction. Studies have shown that tortoises are essentially absent from habitat within 1 km of areas with greater than 10 percent development, including urban development, cultivated agriculture, energy development, surface mines and quarries, pipelines and transmission lines, and roads and railroads (Carter, et al. 2020). Operation and maintenance activities along the gen-tie line and access roads and within the Project site would be a continued source of noise and ground-vibration disturbance, resulting in long-term impacts to behavior, and direct mortality or injury of Mojave desert tortoise from being crushed by Project-related vehicle traffic. Implementation of mitigation measures and best management practices (BMPs) such as reduced speed limits and WEAP training for personnel would minimize impacts to desert tortoises during operation and maintenance activities.

Desert tortoises would be prohibited from inhabiting the solar field during operations, which would result in fewer direct impacts to individuals but could result in long-term impacts to movement and connectivity of the species around the fenced Project site. Due to the high likelihood for negative impacts to the species from Project operation and the reduced habitat quantity and quality within the Project site, it is determined that exclusion of Mojave desert tortoise for the duration of the Project is the preferred method for minimizing species decline.

Project access roads are not anticipated to decrease population connectivity substantially beyond the existing conditions. As discussed in the revised recovery plan (U.S. Fish and Wildlife Service 2011) and elsewhere (U.S. Fish and Wildlife Service (USFWS) 2022; California Department of Fish and Wildlife 2024), habitat linkages are essential to maintaining range-wide genetic variation (Edwards, et al. 2004, Averill-Murray, Esque, et al. 2021)(Beier, Majka, and Spencer 2008; Averill-Murray et al. 2013) and the ability to shift distribution in response to environmental stochasticity, such as climate change (Lovich, Yackulic, et al. 2014). Natural and anthropomorphic constrictions (such as development and highways) can limit gene flow and the ability of desert tortoises to move between larger blocks of suitable habitat and populations (Dutcher 2020, U.S. Fish and Wildlife Service 2022). In the analysis area, existing anthropomorphic constrictions compound effects of natural barriers on desert tortoise population connectivity.

Solar PEIS PDF ER2-1 would incorporate measures to exclude tortoises from entering solar development sites. Tortoise-proof fencing specifications would be consistent with those approved by the USFWS in the Desert Tortoise Field Manual (U.S. Fish and Wildlife Service 2009) and tortoise guards would be implemented at all road access points where desert tortoise-proof fencing is interrupted. In addition to the Translocation Plan for Stump Springs Regional Augmentation Site required as part of the BLM ROW Grant, the Stump Springs Desert Tortoise Long Term Monitoring Plan is being developed through coordination between the BLM and USFWS to establish a 30-year study to monitor the long-term impacts of translocation on desert tortoises to the Stump Springs Regional Augmentation Site and long-term impacts of habitat loss and fragmentation from implementation of the Project.

Yuma Ridgway’s Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo

Operation and maintenance of the Project may result in adverse impacts to Yuma Ridgway’s rails, southwestern willow flycatchers, and western yellow-billed cuckoos, including direct mortalities resulting from collision and/or electrocution associated with the solar facility. Once constructed, utility-scale solar projects pose multiple fatality risk factors. Birds can collide with solar panels, battery storage systems, the O&M building, transmission lines, fencing, and vehicles servicing the Project. Risk of collision potential would be greatest during spring or fall migration seasons (Kosciuch, Riser-Espinoza and Gerringer, et al. 2020, Smallwood 2022). Avian interactions with PV solar facilities themselves are not well understood, and the level of mortality observed at solar facilities and the effects on species populations is variable (Kosciuch, Riser-Espinoza and Gerringer, et al. 2020, Smallwood 2022). However, solar developments are known causes of avian mortalities and, when cause of death has been determinable, collision with a panel or other solar infrastructure has composed the highest percentage of known causes (Kagan 2014, Kosciuch, Riser-Espinoza and Gerringer, et al. 2020). Yuma Ridgway’s rails have been found deceased at solar facilities in the Mojave Desert (Harrity and Conway 2020).

Yuma Ridgway's rail is a waterbird species, and the southwestern willow flycatcher and western yellow-billed cuckoo are associated with riparian habitat along waterbodies. As described in Section 3.4: Biological Resources, Wildlife, Migratory Birds, and Other Special Status Species, these birds may potentially mistake the solar panels for water features on which they can land. These behaviors may lead to collisions with PV solar panels resulting in mortality, injury, or stranding in areas of inhospitable habitat for these species. This "lake effect theory" was first described in Horváth et al. (2009) as the effects on bird species from *polarized light pollution* (PLP) produced by large-scale solar energy projects. Utility-scale PV solar facilities may attract migrating waterfowl and shorebirds through PLP, whereby migrating birds perceive the reflective surfaces of PV solar panels as bodies of water and collide with the structures as they attempt to land on the panels (Horváth 2009, Kagan 2014, Chock, et al. 2021, Smallwood 2022, Kosciuch, Riser-Espinoza and Gerringer, et al. 2020, Kosciuch, Riser-Espinoza and Moqtaderi, et al. 2021). There are many reported anecdotal events to support this theory, but to date limited research has been conducted to evaluate the attraction of PV facilities to migrating waterfowl or songbirds.

None of these species were observed during avian surveys, and there are no major water bodies to concentrate waterbirds or riparian species during migration, breeding, or stopover periods close to the Project site. The nearest larger water bodies are in Ash Meadows NWR and the Amargosa River, approximately 30 miles from the Project site. Because waterbirds generally move along migratory corridors with existing water sources and available stopover habitat, these species would be expected to concentrate along the lower Colorado River and tributaries, reducing the likelihood of these species to be present within the Project area. In addition, water used for operation and maintenance of the Project would be sourced from a different groundwater basin than where the nearest habitat for either species is located (Ash Meadows NWR) and would not affect wetland and riparian habitat in that area.

Impacts to Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos would be minimized through implementation of Solar PEIS PDF ER3-1, which requires methods to reduce impacts to avian species during operation and maintenance of the Project. The Bird and Bat Conservation Strategy would include a Bird and Bat Monitoring and Adaptive Management Plan for the Proposed Action to assist in avoiding and minimizing impacts on migratory birds for the duration of the Project. The monitoring would include reporting fatalities associated with powerlines and PV panels as well as overall annual mortality. Monitoring plans would be designed to account for seasonal differences and fatality events of rare species. The WEAP would be provided on a regular basis during operation to ensure the continued ecological awareness during all phases of the Project's life and would incorporate adaptive management protocols for addressing ecological changes over the life of the Project, should they occur.

Decommissioning Impacts

Mojave Desert Tortoise

Decommissioning activities would result in fewer adverse effects than those described for construction. Direct adverse effects to desert tortoises would not be expected within the Project site since tortoises would be excluded from the area for the 30-year Project duration. However, should individuals be present at the time of decommissioning, potential impacts would be the same as described for construction. The use of heavy equipment and other activities associated with decommissioning of the Project could crush unknown tortoises present and result in injury or mortality. If tortoises are discovered on site prior to or during decommissioning, translocation would occur in accordance with the Translocation Plan for Stump Springs Regional Augmentation Site, and potential adverse effects would be as previously described for construction. Temporary disturbances to Mojave desert tortoises in adjacent habitats could occur from noise, dust and dust suppression, ground vibrations, and human and vehicle presence associated with decommissioning and would be similar to those resulting from construction of the Project. These impacts would be minimized by implementation of the Solar PEIS PDFs and required plans discussed for construction.

Once site decommissioning and reclamation are completed, desert tortoises would be allowed back into the area, and movement patterns through the Project site would be restored with the removal of perimeter fencing. Long-term effects to habitat for desert tortoise following decommissioning would be similar to those described for wildlife in Section 3.4: Biological Resources, Wildlife, Migratory Birds, and Other Special Status Wildlife. While Solar PEIS PDF 4-1 would require rehabilitation of native vegetation to begin immediately upon decommissioning, in accordance with the Site Restoration-Revegetation & Decommissioning-Reclamation Plan, it would take several decades or longer before the site becomes functioning habitat again. Repeated restoration efforts would likely be required, which could adversely affect tortoises that have reinhabited the site. As described for construction of the Project, Solar PEIS PDFs would require surveys prior to any restoration activities that could cause disturbance or harm to desert tortoises.

Overall, decommissioning would result in long-term degradation to habitat quality across the 1,950 acres disturbed in the development area for construction and operation of the Project. To monitor and reduce these impacts, the Project would adhere to a Desert Tortoise Habitat Linkage Management and Monitoring Plan and Desert Tortoise Population Connectivity Effectiveness-Monitoring Plan, which BLM is developing in coordination with the USFWS.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo

Decommissioning of the Project would have beneficial effects for Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos. While there would still be some risk of collision with equipment and vehicles during site decommissioning and reclamation, removal of the solar facility would eliminate the future risk of injury or mortality. With the solar panels removed, there would no longer be the potential for disorientation from the glare and risk of any of these species mistaking the solar site for water and attempting to land in the area. After decommissioning, there will no longer be solar facility equipment, buildings, or transmission lines, and the risk for collision and/or electrocution to migrating Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos from the Project would be eliminated.

Cumulative Impacts

There are a number of projects and other management actions in the region that would contribute to cumulative impacts to threatened and endangered species, including other existing and proposed utility-scale solar projects, Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Yellow Pine, Borderline Solar, Sun Baked Solar, and Bonanza Peak and associated transmission lines located on nearby BLM lands. Most of the projects considered for cumulative effects would involve ground disturbance and vegetation removal, resulting in the loss of habitat in the Mojave Desert region. Additionally, while not all private lands in the Pahrump Valley have planned development, private lands cannot be used for long-term vegetation connectivity planning as no single public agency or plan governs development. Table 3.16-6 and Table 3.16-7, in Section 3.16: Vegetation, identify the maximum impact potential on Pahrump Valley vegetation communities in both Nevada and California. The bulk of these vegetation communities are habitat for threatened and endangered species. Table 3.16-8, in Section 3.16: Vegetation, provides the cumulative disturbance acreages for the Proposed Action and solar projects by disturbance type.

Similar to the Proposed Action, these cumulative projects could also likely result in the proliferation of invasive species and fugitive dust in the area. Also, increased fire frequency or intensity resulting from a combination of abundant invasive plant fuels and higher likelihood of anthropogenic ignitions could have potentially severe ecosystem effects, adversely affecting sensitive plant communities and wildlife (Berry and Murphy 2019) (Abella, Gentilcore and Chiquoine 2021, Chambers, Brooks, et al. 2013, Grodsky, Tanner and Hernandez 2020). Transportation projects along SR 160 are also a source of past and future impacts to wildlife, including a recent widening of SR 160 completed in 2020 as well as proposed future road improvements and a bypass project.

Mojave Desert Tortoise

Cumulative solar projects, Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Yellow Pine, Borderline Solar, Sun Baked Solar, and Bonanza Peak, would result in a long-term loss of tens of thousands of acres of vegetation, resulting in large-scale habitat loss and fragmentation for desert tortoises in the Pahrump Valley, see Table 3.16-8. For the purposes of analysis, it is assumed that the proposed construction methods for other projects would be similar to those for the Proposed Action (primarily drive and crush [D-2] and clear and cut with soil removal [D-3] disturbance levels), which would result in mostly long-term and/or permanent impacts to existing habitat. It is also assumed that tortoises would be translocated and excluded from the cumulative solar sites for the duration of the projects. Vegetation would be removed to allow for installation of various facilities, and large areas would also require ground disturbance such as grading that would result in permanent loss of native vegetation in those areas. This cumulative vegetation loss and an increased risk of invasive species spread would result in substantial adverse effects to these resources throughout the Pahrump Valley, resulting in reduced habitat quality and lowered overall resilience of desert tortoises to future disturbances such as climate change.

Large areas of desert tortoise habitat across the Mojave Desert region have already been developed or approved for development for utility-scale solar energy projects (U.S. Fish and Wildlife Service 2022). Within the Pahrump Valley, other large-scale solar project ROWs being considered by the BLM could be developed adjacent the Project site and could result in up to 31,417 acres of long-term or permanent habitat loss for the Mojave desert tortoise in the Pahrump Valley. Private lands encompass an additional 89,441 acres within the Pahrump Valley. A total of 123,239 acres of habitat have a reasonably foreseeable potential to be removed from the 435,655 acres of lower elevation habitat in the Pahrump Valley (Section 3.16).

Permanent habitat loss for large-scale solar projects, which are viable for 30 to 40 years, continuously reduces the chances of implementing species recovery for the Mojave desert tortoise. This species in particular requires large expanses of lower-elevation Mojave vegetation to survive, and the more that is permanently removed, the harder it is for this species to persist. Due to the large amounts of habitat that would be excluded from tortoises and removed and/or degraded from construction once all of the other solar projects are developed in this area, it is possible that desert tortoise would not be able to reoccupy the areas covered by solar projects until it has been sufficiently restored. If not enough native seed is available, or if climatic conditions change such that vegetation cannot be restored, tortoise may never reoccupy the approximately 31,417 acres of habitat loss under the Proposed Action cumulative scenario.

In addition to habitat loss from proposed solar projects, there are three other proposed projects that could add to cumulative adverse effects to the Mojave desert tortoise population in the Pahrump Valley. The SR 160 and 159 Corridor Improvement Project and the Southwest Nevada Reliability Improvement Project transmission line are both located along the northern boundary of the Stump Springs Regional Augmentation Site. The gen-tie options for the Frontera Solar Project would cross the Stump Springs Regional Augmentation Site, see Figure 3.5.4 in Appendix D. An increase in tortoise populations in the Stump Springs area due to translocations from proposed solar project sites could exacerbate the adverse effects the cumulative projects could have on the regional population, including increased mortality from project construction activities or an increased risk of vehicle collisions, as well additional habitat degradation and fragmentation.

There is an important connectivity corridor for desert tortoises between priority habitats, which is a narrow strip of undeveloped bajada between the Spring Mountains and the town of Pahrump. The linear projects, SR 160 and 159 Corridor Improvement Project, the Southwest Nevada Reliability Improvement Project transmission line, the SR 160 Bypass Project, and the ARES Energy Storage Project are all within this connectivity corridor. The cumulative effect of all of these projects within this connectivity corridor would be substantially adverse for desert tortoise connectivity. The Proposed Project would not be located in this connectivity corridor, and would therefore not contribute to habitat degradation within that corridor.

The Proposed Action would result in direct and indirect effects to the Mojave desert tortoise that would be similar across other large-scale solar projects in the region and would contribute to the cumulative adverse effects on desert tortoise in the analysis area. Impacts such as direct harm, stress, or mortality from heavy equipment, handling and translocation, movement barriers from exclusion fencing, ground disturbances, and introduced attractants for predators would be expected to occur with construction and operation of cumulative solar projects or other developments. Development of the Project, in combination with the adjacent large-scale solar projects, would cause habitat fragmentation and connectivity barriers for the species and disruptions to desert tortoise population linkages. Because other projects are proposed to overlap in time and would be built out across large areas of Mojave desert tortoise habitat adjacent the proposed Project site, the cumulative adverse effects from habitat loss and fragmentation would be substantial (Averill-Murray, Esque, et al. 2021).

Implementation of various plans and mitigations would be required for other projects in the Pahrump Valley to minimize impacts to the species, as described for the Proposed Action, including the Translocation Plan for Stump Springs Regional Augmentation Site and the Stump Springs Desert Tortoise Long Term Monitoring Plan. Mitigation Measure WILD-4 would require a compensation fee that would partially offset the Proposed Action’s contribution to the long-term adverse cumulative impacts to Mojave desert tortoise. The fee is a one-time per acre fee paid to the BLM that would be used throughout the life of the Project to minimize residual effects to desert tortoise through Pahrump Valley-specific activities such as purchasing inholdings within the connectivity corridor between Spring Mountains and the town of Pahrump, restoring habitat in Pahrump Valley, fixing or new desert tortoise fencing in Pahrump Valley, or funding research for translocation or relocation success for desert tortoise. However, due to the scale of the cumulative projects and likely overlap in timeframes for ROW periods, many long-term adverse impacts to Mojave desert tortoise would be unavoidable.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo

Large-scale solar installations across 31,417 acres in the region would also contribute to increased risk of collisions for Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos. With such large areas covered by solar panel arrays, the potential for the lake effect to disorient migrating birds would potentially increase, and cumulative adverse effects to waterbirds could be substantial if they use the area in large numbers. Development of other solar projects would also entail associated transmission lines, which could significantly increase risks of electrocution. Current understanding of the regional impacts of utility-scale solar facilities on migrating birds is limited despite the pace and scale of development (Chock, et al. 2021, Kosciuch, Riser-Espinoza and Moqtaderi, et al. 2021). However, solar developments are known causes of avian mortality, and at this scale could have a cumulatively adverse effect to the Yuma Ridgway's rail, southwestern willow flycatcher, and western yellow-billed cuckoos. Implementation of Solar PEIS PDFs and required plans and mitigation measures to protect migratory birds would reduce the Project's contribution to the cumulative adverse impacts, but long-term adverse impacts would be unavoidable.

3.5.6 Alternative 1 – Resources Integration Alternative

Construction Impacts

The Resources Integration Alternative would require that grading be kept to 20 to 21.5 percent of the development area, which would allow for approximately 406 acres of grading (D-3). Within construction areas for the solar panel arrays, this alternative would require that topography, soils, and vegetation be left in place and that the installation of solar array components occur over these existing resources. The maximum disturbance threshold to perennial vegetation would be 40 percent of the total area of each panel array block (drive and crush, D-2), resulting in a minimum of 60 percent of native vegetation communities preserved within the 926 acres proposed for overland travel (D-1) and/or vegetation trimming for construction and operation. If spot grading or leveling is needed within the block, that area would be counted towards the maximum disturbance threshold for grading.

Mojave Desert Tortoise

As described for the Proposed Action, Mojave desert tortoises would also be excluded from the site under the Resources Integration Alternative, during construction, with the same methods for exclusion fencing and translocations. Impacts to this species during the construction phase would be the same as for the Proposed Action. The duration of disturbance to desert tortoises from construction activities would be likely be the same as the Proposed Action (e.g., noise, dust, human presence, potential for harm due to equipment and vehicle use), but the intensity and spatial scale would be reduced due to smaller areas of vegetation removal and ground disturbance.

This alternative would reduce the overall adverse impacts to Mojave desert tortoise habitat and migration (if tortoises are granted access to the Project site) and may reduce long-term impacts to the regional population as described under operation and maintenance impacts. However, impacts from initial exclusion and translocations would still occur and could result in adverse impacts to individual tortoises. All Solar PEIS PDFs and plans required by the BLM for mitigating negative impacts to desert tortoise from construction of the Project would remain the same as the Proposed Action except for WILD-1, which is not required because Alternative 1 already incorporates this element.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoo

Construction of the Resources Integration Alternative would result in the same potential impacts to Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos as the Proposed Action. As described for the Proposed Action, the Project site does not contain suitable habitat for any of these species, so there would be no impacts to habitat that would result in differences between the alternatives. Potential impacts to these species from the Project involve collision with the solar facility equipment and transmission lines, and these components would remain the same under both alternatives.

Operation and Maintenance Impacts

Mojave Desert Tortoise

As described in Chapter 2.0 Alternatives, Mojave desert tortoises may be allowed to enter the site during Project operation under the Resources Integration Alternative because the wildlife openings would have the potential to be extended to the ground if it is determined that tortoises should be granted access. This would occur once the solar facilities along the western and southern perimeter of the Pahrump Valley adjacent to open habitat, potentially the Copper Rays and Mosey Projects if they are approved, are constructed, and if it is determined that tortoises should be granted access to the Project site based upon habitat condition standards determined by the BLM and USFWS. This would modify the openings to allow for ingress and egress of desert tortoise in addition to other wildlife and may reduce impacts to long-term impacts to the regional populations. Shade structures at the wildlife openings will be utilized until it is determined they are no longer necessary. In addition, the BLM and USFWS will require minimization measures specific to desert tortoise during the operation and maintenance phase, including a desert tortoise education program, reduced speed limits, and monitoring. If it is determined that tortoise access should be prohibited at any point after extension, cut sections may be replaced to reestablish exclusion from the Project site, see Section 3.5.8. Temporary disturbances to Mojave desert tortoises within the Project site or that inhabit adjacent habitats could occur from noise, dust and dust suppression, ground vibrations, and vehicle use associated with operation and maintenance and would be similar to those resulting from the Proposed Action. These impacts would be minimized by implementation of Solar PEIS PDFs and required plans discussed for above for operation and maintenance of the Proposed Action.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoos

Operation and maintenance under the Resources Integration Alternative would result in the same potential impacts to Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos as the Proposed Action. Potential impacts to these species from Project operation involve collision with the solar facility equipment and transmission lines, and these components would remain the same under both alternatives.

Decommissioning Impacts

Mojave Desert Tortoise

Decommissioning under the Resources Integration Alternative is anticipated to affect areas previously disturbed during Project construction. Decommissioning would result in direct and indirect impacts to Mojave desert tortoise similar to those described for construction for this alternative.

With less impactful construction methods, vegetation communities would recover more quickly than for the Proposed Action, and it is anticipated that more suitable desert tortoise habitat would remain largely intact during and after the operation of the facility. Native seed banks and soils would be maintained over most of the Project site.

Following completion of the Project duration, decommissioning and site restoration would be more successful due to fewer areas of permanent disturbance (D-3) as compared to the Proposed Action and higher amounts of perennial vegetation maintained through construction and the life of the Project. Larger areas of native plant communities preserved and reduced areas of heavy soil disturbance would likely result in reduced invasive species infestations and less loss of the soil seed bank. Natural plant recruitment would be likely to occur in areas with limited disturbance. Since vegetation and native seedbanks would be retained on the site throughout the life of Project, it is expected that desert tortoise habitat within the Project site would recover more easily after decommissioning and require less effort to restore than under the Proposed Action, and intensive restoration would likely only be needed in graded areas. Most importantly, it is expected that the site would recover more quickly, allowing for restoration of functional desert tortoise habitat within the area within 5 to 10 years after decommissioning, as opposed to centuries for a full recovery compared with the Proposed Action (Abella 2010; Chambers et al. 2013; Hernandez et al. 2014; Lovich and Bainbridge 1999). The long-term impacts to desert tortoise habitat and connectivity would be substantially reduced (Averill-Murray, Esque, et al. 2021).

This species would be allowed to inhabit the site following decommissioning and reclamation, but long-term impacts to the regional population from exclusion and translocations could still occur, including reduced reproductive success for translocated individuals (Mulder et al. 2017) . Implementation of the Translocation Plan for Stump Springs Regional Augmentation Site, Stump Springs Desert Tortoise Long Term Monitoring Plan, and Solar PEIS PDFs as described for the Proposed Action would reduce potential adverse effects on desert tortoise during decommissioning. Restoration of tortoise populations within the Project site after decommissioning would be much quicker under this alternative.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoos

Decommissioning under the Resources Integration Alternative would result in the same potential impacts to Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos as the Proposed Action. As described for the Proposed Action, the Project site does not contain suitable habitat for any of these species, so there would be no impacts to habitat that would result in differences between the alternatives. Potential impacts to these species from the Project involve collision with the solar facility equipment and transmission lines. These components would be the same under both alternatives and would be removed during decommissioning.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in Nevada incorporate similar construction techniques as the Resources Integration Alternative to reduce effects to habitat in the Pahrump Valley. It does not assume similar construction techniques for projects in California as they are governed by a different management plan and under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. Table 3.16-8, in Section 3.16: Vegetation, provides the cumulative disturbance acreages for the Resources Integration Alternative cumulative scenario by disturbance type. As noted in Table 3.16-8, over 10,000 acres of habitat within the total 31,417 acres covered by potential solar projects would either be avoided entirely or built using the overland travel technique which would retain the vegetation and habitat in those areas. This would facilitate future recovery on other nearby areas by retaining a native seed source and eventually allowing tortoise reoccupation after decommissioning.

Mojave Desert Tortoise

Due to the likelihood that negative impacts would occur to desert tortoises that inhabit cumulative project sites and the conclusion that removing them from development areas would be the best approach for species conservation, it is assumed that tortoises would be translocated and excluded from other solar sites for the duration of their ROW periods. Impacts related to translocation and exclusion from native habitats would be the same as described for the Proposed Action. This would result in tortoises excluded and translocated from approximately 31,417 acres of habitat in the Pahrump Valley for the next several decades or longer, which would have substantial adverse impacts on the translocated populations as well as resident populations of tortoises at the Stump Springs Regional Augmentation Site where translocated individuals are released.

Overall, if the Resources Integration Alternative were implemented with the other solar developments proposed in the Pahrump Valley, there would be reduced cumulative impacts to Mojave desert tortoise habitat across the region. Lower native vegetation disturbance thresholds required by this alternative and reduced areas of intensive ground-disturbance would result in larger areas of higher quality habitat remaining for desert tortoises within the cumulative development areas, which they would be potentially allowed to reinhabit after completion of the proposed projects. Reduced ground disturbance would promote quicker recovery of habitat compared to grading or repeated crushing, natural plant recruitment would be more likely to occur in areas with limited disturbance, and fugitive dust and invasive species infestations would less likely (Chambers et al. 2014; Copeland et al. 2017; Grodsky and Hernandez 2020; Kobelt 2020; Lovich and Ennen 2011). Limiting grading to 20 percent of the area and retention of perennial vegetation across 60 percent of the development areas would reduce impacts to breeding and foraging habitat. While this alternative would still result in long-term impacts to habitat, requiring more limited surface disturbance would preserve better habitat function and connectivity for desert tortoise (Council on Environmental Quality 2023)(Carter et al. 2020). However, it is important to note that this amount of habitat preservation may not maintain population sizes needed for demographic or functional connectivity of the species.

As described for the Proposed Action, it is assumed that any unknown, yet-discovered Mojave desert tortoise adults, juveniles, and/or eggs encountered during construction, operation and maintenance, and decommissioning of other cumulative projects would be reported to BLM and USFWS and that translocation plans and other adaptive management strategies and habitat monitoring would be implemented for these other projects in accordance with required plans and Solar PEIS PDFs to minimize impacts to the species.

While the Resources Integration Alternative would still result in impacts to desert tortoises in the Pahrump Valley, cumulative impacts to desert tortoise habitat and, therefore, for desert tortoise if it were to return to the Pahrump Valley after the completion of the projects, would be substantially reduced under this alternative if it were implemented across all other proposed solar projects. This would result in fewer cumulative effects on Mojave Desert habitat for desert tortoise, southern Nevada in particular, and this alternative would be in better compliance with the Solar PEIS PDFs for mitigating effects to desert tortoises. Even with the less impactful construction methods, Alternative 1 would be expected to have irreversible and irretrievable effects to desert tortoise and contribute to cumulative adverse effects to the species. As with the Proposed Action, Mitigation Measure WILD-4 would require a compensation fee that would partially offset the Alternative's contribution to the long-term adverse cumulative impacts to Mojave desert tortoise. The fee is a one-time per acre fee paid to the BLM that would be used throughout the life of the Project to minimize residual effects to desert tortoise through Pahrump Valley-specific activities such as purchasing inholdings within the connectivity corridor between Spring Mountains and the town of Pahrump, restoring habitat in Pahrump Valley, fixing or new desert tortoise fencing in Pahrump Valley, or funding research for translocation or relocation success for desert tortoise.

Because the anticipated recovery time post-Project is expected to be much less for the Resources Integration Alternative than for the Proposed Action (5–10 years, as opposed to hundreds of years), there would be fewer cumulative impacts to habitat over time. Retaining vegetation also improves habitat resiliency for desert tortoise to adapt to climate change impacts if they were to be reintroduced to the Pahrump Valley, as compared to the Proposed Action.

Yuma Ridgway's Rail, Southwestern Willow Flycatcher, and Western Yellow-billed Cuckoos

The Resources Integration Alternative would result in the same potential cumulative impacts to Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos as the Proposed Action. As described under the Proposed Action, the Project site does not contain suitable habitat for any of these species, so there would be no impacts to habitat that would result in differences between the alternatives. Potential cumulative impacts to these species from the Project and other adjacent solar developments in the Pahrump Valley involve collision with the solar facility equipment and transmission lines. The surface area of the combined large-scale solar installations across 31,417 acres in the Pahrump Valley and all associated equipment, buildings, and transmission components would be the same under both alternatives and would result in the same level of cumulative effects.

With such large areas covered by cumulative solar projects, the potential for the lake effect to disorient migrating Yuma Ridgway's rails, southwestern willow flycatchers, and western yellow-billed cuckoos would increase, as would the risk of collision and electrocution from other solar project components. Implementation of Solar PEIS PDFs and required plans and mitigation measures to protect migratory birds would also be required under this alternative and would reduce the Project's contribution to the cumulative adverse impacts, but many long-term adverse impacts would be unavoidable.

3.5.7 No Action Alternative

Under the No Action Alternative, the Rough Hat Clark Solar Project would not be constructed, and existing land uses would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP. There would be no impacts to special status wildlife species, and existing habitat conditions and trends would remain.

3.5.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are summarized in Appendix B. Minimization measures specific to Mojave desert tortoise will be further developed in detail in the Biological Assessment and Biological Opinion that is being drafted for the Project. Preliminary minimization measures from the Biological Assessment are presented below but additional measures may be required based on consultation. The Project would comply with the following Solar PEIS PDFs and mitigation measures to minimize adverse impacts to special status wildlife:

Solar PEIS Programmatic Design Features

- General
  - ER1-1: Project developers shall consult with the BLM and other federal, state, and local agencies in the early phases of project planning to help ensure compliance with federal regulations that address the protection of fish, wildlife, and plant resources, with appropriate federal, state, and local agencies.
  - SR1-1: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the project planning process to assess soil erosion and geologic hazard concerns and to minimize potential impacts.
  - HMW1-1: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the planning process to assess hazardous material and waste concerns and to minimize potential impacts.
- Site Characterization, Siting and Design, Construction
  - ER2-1: Solar facilities shall be sited and designed, and constructed to avoid, minimize, or mitigate impacts on ecological resources.
  - SR2-1: Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.
  - AQC2-1: Solar facilities shall be sited and designed and constructed to minimize impacts on air quality.
  - VR2-2: Solar facilities shall be sited and designed to minimize night-sky effects.
  - HMW2-1: Solar facilities shall be characterized, sited and designed, and constructed to minimize hazardous materials and waste management design elements.
- Operation and Maintenance
  - ER3-1: The developer shall manage vegetation utilizing the principles of integrated pest management, including biological controls to prevent the spread of invasive species, per the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, and the National Invasive Species Management Plan, 2009*. Consultation with the BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.

   - ER3-2: The developer shall, in consultation with the BLM and appropriate federal, state, and local agencies, manage projects so as to minimize impacts on ecological resources during operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
   - SR3-1: Compliance with the conditions for soil resources and geologic hazards shall be monitored by the project developer. Consultation with the BLM shall be maintained through the operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
   - SR3-2: Permanent stabilization of disturbed areas shall occur during final grading and landscaping of the site and be maintained throughout the life of the facility.
- Reclamation and Decommissioning
   - ER4-1: Reclamation of the construction and project site shall begin immediately after decommissioning to reduce the likelihood of ecological resource impacts in disturbed areas as quickly as possible.
   - SR4-1: All design features for soil erosion and geologic hazards developed for the construction phase shall be applied to similar activities undertaken during the decommissioning and reclamation phase.
   - SR4-2: To the extent possible, the original grade and drainage pattern shall be re-established.
   - SR4-3: Native plant communities in disturbed areas shall be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of recommendations by the BLM, once decommissioning is completed.

Southern Nevada District Office Project Design Features

- Gen-1: Specifies desert tortoise and security fencing details.
- Veg-1: Vegetation disturbance will be minimized to the maximum extent possible.
- Wild-1: Gravel where desert tortoises may be present must be small enough that a juvenile desert tortoise can move through it without becoming stuck.
- Wild-2: Do not feed wildlife.

Plans required as part of the BLM ROW Grant, Mitigation Measures, and Preliminary Minimization Measures in the Biological Assessment

- Dust Abatement Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- Integrated Weed Management Plan
- Bird and Bat Conservation Strategy
- Fencing Plan (Desert Tortoise Exclusion and Security)
- Nuisance Animal and Pest Control Plan
- Technical Drainage Plan
- Lighting Plan
- SNDO Raven Management Plan

- Southern Nevada Nesting Bird Management Plan
- Translocation Plan for Stump Springs Regional Augmentation Site
- Worker Education and Awareness Plan
- Spill Prevention, Control, and Countermeasures Plan
- Fire Management Plan
- Hazardous Materials and Waste Management Plan
- Trash Abatement Plan
- MM WILD-1: Reduced Project Footprint: During preparation of the final Plan of Development, the Applicant shall coordinate with the BLM to minimize the amount of ground disturbance needed to effectively construct and operate the facility. All disturbance areas shall be refined and designed to the minimum size needed to safely operate the facility, including access roads. Justifications for disturbances, such as access road widths, substrates, locations, and frequency, shall be provided upon BLM request during review of the revised footprint.
- MM WILD-3: Desert Tortoise Burrow Avoidance: For the action alternatives that involve retention of vegetation, an authorized biologist will map and flag desert tortoise burrows prior to fence and solar array block installation, if flagging will not attract poaching. Flagging can be done in phases if construction will be phased. Avoidance flagging will be designed to be easily distinguished from access route or other flagging and will be designed in consultation with experienced construction personnel and authorized biologists. This flagging will be removed following construction completion. Class 1, Class 2, and intact Class 3, tortoise burrows will be avoided for all temporary tortoise exclusion fencing and if at all possible, for permanent fencing and solar array block construction. If a burrow must be destroyed for fencing or solar array block construction to occur, then it will be visually and tactilely examined for occupancy by tortoises and other wildlife. If occupancy is negative or cannot be established, the burrow will be carefully excavated with hand tools. To the extent consistent with Project design, Class 1, Class 2, and intact Class 3 burrows that can be avoided will not be collapsed during perimeter fence and solar array block construction to allow occupancy by wildlife and Mojave desert tortoise (if allowed to reoccupy under Alternative 1). The Biological Opinion will further address requirements around tortoise burrows.
- MM WILD-4: Desert Tortoise Cumulative Compensation Fee. To compensate for cumulative loss of Mojave desert tortoise habitat in the Pahrump Valley, the ROW grant holder will pay fees to the BLM to partially offset the Project's contribution to cumulative adverse effects on desert tortoise. The mitigation fee is a one-time per-acre fee paid by the ROW grant holder for the acres disturbed by the Project based on final engineering. The fee would be assessed within 30 days prior to issuance of a notice to proceed. The fees will be administered over the life of the Project.
  - The fees will fund local, Pahrump Valley-specific mitigation to minimize residual impacts to desert tortoise and their habitat. Mitigation fees will be used for actions such as but not limited to the following:
  - purchasing inholdings within the Mojave desert tortoise connectivity corridor between the Spring Mountains and the town of Pahrump;
  - restoring habitat within the Pahrump Valley to increase the functionality of the local ecosystem to improve the resources for desert tortoise;
  - installing appropriate infrastructure such as fixing desert tortoise fencing or new desert tortoise fencing; and
  - funding research notably associated with connectivity, translocation success, and restoration success of desert tortoise.

The BLM will complete a separate NEPA analysis to identify the impacts of the mitigation project, as appropriate.

- MM PS-3: Fire Prevention and Safety Plan (see Section 3.9)
- BA Minimization Measures:
  - Select translocation sites within Stump Springs that exhibit an increased availability of cover for predator avoidance. Sites would include those containing washes, existing caliche dens, adequate densities of vegetation, and additional cover sources.
  - Conduct predator surveys at sites within Stump Springs for potential and prior to translocation to determine if predator density and/or abundance may contribute to an increased likelihood of predation. Tortoises would be translocated to those areas where predator density and/or abundance is determined to be low or of minimal potential consequence to tortoise survivability in comparison with other selected sites.
  - Disperse translocation sites for tortoise across the landscape of Stump Springs in order to alleviate the potential for localized predator subsidy and to ensure adequate cover and foraging resource availability for translocated individuals. Dispersing translocation sites and reducing the number of individuals received at each site may serve to lessen the probability of predator recognition within a given area and may provide more resources for individual tortoises, contributing to lower total exposure time during cover location and forage acquisition for the species.
  - Additional adaptive measures may also be implemented as new developments in predation reduction methods are approved on an as needed basis.
- O&M Minimization Measures to Include for Projects Required to Allow Tortoise Access:
  - Desert tortoise education program: A desert tortoise education program will be presented to all personnel on site during O&M activities by an agency or authorized desert tortoise biologist. The BLM will approve the program. At a minimum, the program will cover desert-specific Leave-No-Trace guidelines, the distribution of desert tortoises, general behavior and ecology of this species, sensitivity to human activities, threats including introduction of exotic plants and animals, legal protection, penalties for violation of State and Federal laws, reporting requirements, and project measures in this biological opinion. All field workers will be instructed that activities must be confined to locations within the approved areas and their obligation to walk around and check underneath vehicles and equipment before moving them. In addition, the program will include fire prevention measures to be implemented by employees during project activities. The program will instruct participants to report all observations of desert tortoise and their sign during construction activities to the FCR or CIC and the BLM.
  - Vehicle travel: Project personnel will exercise vigilance when commuting to, from, and within the project area to minimize risk for inadvertent injury or mortality of all wildlife species, including desert tortoise, encountered on paved and unpaved roads. Speed limits will be clearly marked, and all workers will be made aware of these limits. On-site, personnel will carpool to the greatest extent possible.
  - During the desert tortoise least-active season (generally November through February), vehicle speed on project-related access roads and work areas will not exceed 25 mph. During the less- and most- active seasons (generally March 16 through October 31), and if temperatures are above 60 but below 95 °F for more than 7 consecutive days, vehicle speed on project-related access roads work areas will not exceed 15 mph.
  - Tortoise Access Monitoring: For facilities required to allow access to the project site, a monitoring plan will be implemented at the discretion of the BLM. This monitoring plan will

serve to determine functionality of the modified access openings, desert tortoise response, impacts to desert tortoise, and whether access should be granted to tortoise into the future.

3.5.9 Irreversible and Irretrievable Impacts

Irreversible or irretrievable impacts are those that cannot be reversed or recovered. Implementation of the Proposed Action would result in irreversible or irretrievable impacts on up to 1,950 acres of Mojave desert tortoise habitat across the development area. The Proposed Action would result in the permanent loss of habitat on 649 acres due to grading (D-3), with additional loss and degradation of habitat across the remaining 1,301 acres where drive and crush (D-2) would be used for the construction method. The loss of habitat would result in desert tortoises having to rely more heavily on habitat outside of the Project footprint. Site reclamation, even with substantial effort, is not expected to restore these impacted areas to pre-Project conditions, and restoration could take decades (D-2) to centuries (D-3) on a project of this size. Indirect impacts from the Project (e.g., fugitive dust, spread of invasive weed species) would persist beyond the 30-year ROW period. Permanent adverse impacts to desert tortoise habitat would remain with the construction techniques identified in the Proposed Action even with the identified mitigation measures.

The Resources Integration Alternative would result in irreversible or irretrievable impacts with the permanent loss of desert tortoise habitat where the site is graded (D-3), approximately 406 acres, and on up to 40 percent of non-graded areas (617 acres). This alternative would not result in irreversible or irretrievable impacts to 60 percent of the site (879 to 896 acres) where perennial vegetation would be maintained throughout the life of the Project. Where ground disturbance is avoided or kept to a minimum, vegetation would be trimmed as needed and surface soils and local drainages would be left undisturbed. In these areas, impacts to desert tortoise habitat are expected to be temporary and not irreversible.

Neither the Proposed Action nor Resources Integration Alternative would have irreversible or irretrievable impacts to habitat for Yuma Ridgway's rails, southwestern willow flycatchers, or western yellow-billed cuckoos. Impacts to these species would be associated with the Project facilities and, once they were removed, impacts would no longer be present. No habitat for any of these species would be impacted by the Project.

3.6 Climate Change

3.6.1 Introduction

This section describes and quantifies greenhouse gas emissions from Project activities that may contribute to climate change. The *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* was prepared for the Proposed Action, which includes supplemental information on the regulatory background, existing setting, methodology, and analysis results of climate change impacts for the Project. The laws and regulations that apply to the Project are described in Appendix C.

3.6.2 Analysis Area

Greenhouse gases (GHGs) are global pollutants with atmospheric lifetimes of up to several thousand years, which allows their dispersal around the globe (RCH Group 2023). The analysis of GHGs, like air quality, does not follow a boundary, but the area for comparisons of non-renewable emissions is focused on California and Nevada where the electricity generated from the Project would likely be sold.

3.6.3 Affected Environment

Climate change is a global issue that results from several factors, including, but not limited to, the release of GHGs, land use management practices, and the *albedo effect*, or reflectivity of various surfaces (including reflectivity of clouds). The most common GHGs are carbon dioxide (CO_2) and water vapor. Other critical GHGs include methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). 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* (CO_2e). 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, and drought; and increased levels of air pollution. The effects of these extreme weather events are typically more apparent and severe in environmental justice communities that have historically received economic and social discrimination which makes it harder for them to prepare, respond, and recover to climate threats (U.S. Department of Health and Human Services 2023).

GHGs are produced and emitted by various sources during the construction and operation of projects. The primary sources of GHGs associated with solar projects and associated facilities are CO_2, CH_4, and N_2O from fuel combustion in construction and maintenance vehicles and equipment as well as operational emissions of SF_6 associated with potential leakage from gas-insulated circuit breakers at a substation.

The State of Nevada generates emissions comprising less than 1 percent of the overall emissions in the United States, see Table 3.6-1. Most emissions within Nevada are generated in Clark County due to the relatively large population and tourist attractions. Transportation constitutes the greatest source of GHG emissions in Clark County. GHG emissions in Clark County continuously rose between 2005 and 2014 (SNRPC 2014). The following effects of climate change are anticipated in the State; higher average temperatures, severe and frequent heat waves, increased risk of severe and frequent droughts, decreased snowpacks, and increased risk of wildfires (University of Nevada, Reno n.d.). Furthermore, extreme high temperatures and unpredictable weather poses a danger to human life, the electrical grid, natural ecosystems, livestock, and crops (University of Nevada, Reno n.d.). Extreme heat also impacts air quality, as higher temperatures are associated with increased ozone levels (University of Nevada, Reno n.d.).

Table 3.6-1 Greenhouse Gas Emissions for Nevada and the United States

Location	1990 gross emissions (million metric tons CO_2e)	2005 gross emissions (million metric tons CO_2e)	2019 gross emissions (million metric tons CO_2e)	Percent change 2005 to 2019
United States	6,437	7,392	6,558	–11
Nevada	34.374	56.282	46.337	–18

Source: (USEPA 2021c; NDEP 2021)

3.6.4 Environmental Consequences

3.6.4.1 *Methodology*

No federal emission limits have been developed for GHG emissions, and no technically defensible methodology has been developed for predicting potential changes in climate associated with GHG emissions. Although there are no federal standards for GHG emissions, it is well established that GHG emissions affect climate. The Council on Environmental Quality (CEQ) indicated that climate should be considered in NEPA analyses. In January 2023, the CEQ issued interim guidance "NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change," which assists agencies in quantifying GHG emissions to inform the NEPA review to ensure the context for emissions and climate change impacts in the study area and on the project are disclosed, and provide for an evaluation of how the project could affect ongoing climate change (See 88 Fed Reg. 1196).

The same methodology and assumptions used to estimate the criteria pollutant emissions were used to estimate GHG emissions associated with construction and operations and maintenance activities, see Section 3.3, Air Quality. Additional assumptions were developed to estimate substation emissions. Each circuit breaker was conservatively assumed to contain 175 pounds of SF_6. A total of 42 circuit breakers were assumed to be installed in the Project substation; 5 high voltage circuit breakers; and 31 to 37 medium voltage circuit breakers. Furthermore, it was assumed that the SF_6 emission rate would not exceed 1 percent based on a programmatic plan to inventory, track, and recycle SF_6 inputs, and inventory and monitor system-wide SF_6 leakage rates to facilitate timely replacement of leaking breakers. See the *Rough Hat Clark Solar Project Air Quality and Climate Change Technical Report* for more details regarding the emission calculations.

3.6.5 Proposed Action

3.6.5.1 *Construction Impacts*

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, see Table 3.6-2. As shown in the table, construction would contribute CO_2e over a short period of time (2 years). Climate change is a long-term phenomenon. While the Proposed Action would result in a high level of emissions for a short time, those emissions would be offset by the operational benefits of solar power (refer to Table 3.6-3, below) and would not be adverse.

Table 3.6-2 Estimated Construction Greenhouse Gas Emissions

Source	CO_2e metric tons
Annual construction emissions during 2024	11,776
Annual construction emissions during 2025	11,861
Total construction emissions over entire construction period	23,637
Annual average construction emissions	11,819
Annual amortized construction emissions (30-year timeframe)	788

The estimated total construction GHG emissions for the Proposed Action is 23,637 metric tons of CO_2e. The estimated annual average construction GHG emissions for the Proposed Action is 11,819 metric tons of CO_2e. As indicated in Table 3.6-2, 30-year amortized construction-related GHG emissions would be 788 metric tons of CO_2e per year. Per the USEPA GHG Equivalencies Calculator, the maximum annual emissions generated during construction of the Project would be the same amount of GHG emissions as produced by 1,495 to 2,308 households annually from energy consumption, or 2,639 gasoline-powered passenger vehicles driven for one year, or less than 0.1 percent of the emissions produced by a natural gas-fired power plant in one year (USEPA 2023).

As stated previously, cumulative GHG emissions have been linked to accelerated global climate change. One-time generation of GHG emissions from construction of the Proposed Action would be required to construct the solar project. The total quantity of construction emissions generated would be significantly less than a single year of equivalent energy production using non-renewable resources (refer to Table 3.6-3 for the total equivalent emissions generated for a 400 MW non-renewable energy power plant).

3.6.5.2 *Operation and Maintenance Impacts*

Operation of the Project would generate minimal GHG emissions. As shown in Table 3.6-3, the Project would offset a significant quantity of GHG emissions compared to the equivalent GHG emissions from energy generated at a fossil fuel-fired power plant. SNDO PDF CC-1 would recommend use of SF6 gas free equipment on site, where feasible, and could further reduce the GHG emissions during operations. Potential offset of air emissions from the Proposed Action would be much higher than the air emissions increases generated by Project operations or construction. Compared to energy generated at a fossil fuel-fired power plant, the Project would be beneficial with respect to GHG emissions. Desert landscapes and vegetation provide carbon sequestration and stock that would be partially lost when the site is developed using drive and crush methods and discrete areas of grading. The role desert landscapes play in carbon sequestration is poorly understood; however, a recent report[1] (2024) has provided an overview of the science regarding carbon sequestration in the desert. The maximum level of carbon sequestration loss from the Proposed Action (approximately 665,885 CO_2e) would be only a small portion of the offset achieved over the life of the Project (-11,343,772 to -11,967,378 CO_2e).

[1] See *The California Desert's Role in 30x30: Carbon Sequestration and Biodiversity* at https://desertreport.org/wp-content/uploads/2024/02/Calif-Deserts-Role-in-30x30-CS-and-Biodiversity.pdf.

Table 3.6-3 Operational Emissions Offset Over the Life of the Project (CO_2e Metric Tons)

Emission source	Proposed action
Annual amortized construction emissions (30-year timeframe)	788
Substation	270
Worker trips	205
Offroad equipment	22
Pump/Generator	5
Water trucking	25
Total annual Proposed Action emissions	**1,315**
Total 30-year Proposed Action emissions	**39,447**
Total equivalent emissions generated for 400 MW fossil fuel-fired power plant over comparable timespan (28.2 years)[1]	-12,049,104
Change in annual carbon sequestration (30 years)[2]	42,278 – 665,885
Emissions offset during Project operation	**-11,343,772 to -11,967,378**

Note: [1.] This estimate is based on equivalent energy production and does not account for potential substitution across fuel markets or changes in overall energy demand due to the proposed project.

[2.] Annual carbon sequestration rates vary, depending on the study, from 0.16 MT carbon/acre/year to 2.52 MT carbon/acre/year (RCH Group 2023). One ton of carbon is equivalent to 3.67 tons of CO_2. As vegetation would be allowed to regrow on the Project site, it is assumed that the carbon sequestration loss would be on the lower end. Thirty years is assumed for loss of vegetation as effects would begin during construction.

Climate change is expected to increase the average daily temperature, reduce the availability of water, and increase the risk of wildfires in Nevada. Higher temperatures are not expected to damage the solar equipment or transmission facilities. During operation and maintenance, water use would be low and limited primarily to PV array washing, potable water for employees, and the potential for periodic dust control and maintenance applications. Estimated operational water requirements would be up to 16 acre-feet per year (see Section 3.18 Water Resources). The Project site is within an area of low and low-to-moderate wildfire threat[2] as determined by the Nevada Division of Forestry (Nevada Department of Forestry 2022). If climate change increases the risk of wildfire, this could interfere with the Project operations. However, the Proposed Action would implement Solar PEIS PDF WF 1-1, which requires fire management training for all phases of the Project's life, including operations. The worker training would ensure the workers are aware of key fire mitigation efforts of the Project work site during all phases of the Project's life. Solar PEIS MM PS-1 requires preparation and implementation of a comprehensive Fire Prevention and Safety Plan to minimize adverse effects associated with increased fire hazards during operations, including requiring a battery-specific fire suppression plan. Implementation of Solar PEIS PDFs WF 1-1 and MM PS-1 would reduce adverse effects associated with fire hazards during operation and maintenance (see Section 3.11 Public Health and Safety). The potential effects of climate change on

[2] 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.

the Proposed Action are considered minimal and manageable due to the resiliency of the solar technology, low water demands, and fire management mitigation measures.

3.6.5.3 *Decommissioning Impacts*

Decommissioning/reclamation activities are expected to be similar to construction activities but would occur on a more limited scale and be of shorter duration. Potential effects on climate change would be correspondingly less significant than those from construction activities. Decommissioning activities would last for a shorter period of time. The GHG emissions generated during decommissioning would be offset by the beneficial effects achieved throughout the lifetime of the Project.

3.6.5.4 *Cumulative Impacts*

Past and present actions, including existing land development and energy development, have contributed to the existing greenhouse gas emissions in the analysis area. The cumulative projects that are not renewable energy include the Southwest Nevada Reliability Improvement Project, Pahrump Valley Loop-in Project, SR 160 and SR 159 Corridor Improvements, SR 160 Phase 2 Widening, SR 160 Pahrump Bypass, Prairie Fire Training Facility Project, Gridliance West Core Upgrades Transmission Project, Pahrump Community Pit, and NDOT Mineral Materials Pit. All these non-renewable energy projects would create greenhouse gas emissions in construction and operations that would exacerbate climate change. The cumulative solar projects proposed, Copper Rays, Golden Currant, Mosey, Larrea, Borderline Solar, Sun Baked Solar, Bonanza Peak, and Canyon Mesa, and the existing Yellow Pine project are renewable energy development projects with a proposed total production of over 3,300 MW of renewable energy[3]. Construction-related ground disturbance projected for other projects in the analysis area within the next 5 years would result largely from the development of other solar facilities. The contribution to cumulative impacts from the Proposed Action would constitute an incremental increase in GHG emissions within the analysis area, in particular during the construction period. GHG emissions are inherently a cumulative concern with a cumulatively global scope. While the Project and the cumulative projects would result in GHG emissions during construction, the renewable nature of the cumulative projects would contribute to achieving GHG emissions reduction targets and would result in a cumulative beneficial impact for climate change.

3.6.6 Alternative Action 1

3.6.6.1 *Construction, Operations and Maintenance, and Decommissioning Impacts*

Effects to GHG emissions from Alternative 1 would be similar to those of the Proposed Action. Alternative 1 would use a similar amount of equipment during construction, operation and maintenance, and decommissioning, resulting in similar GHG emissions. Alternative 1 would generate a similar amount of renewable energy as the Proposed Action and so would offset a significant quantity of GHG emissions compared to the equivalent GHG emissions from energy generated at a non-renewable power plant. The effects on GHG emissions would not be adverse. With reduced grading and increased use of overland travel method for development of Alternative 1, the loss of carbon sequestration would be anticipated to be less.

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[3] The Bonanza proposed solar project details are not available so the total MW of energy would be higher if this project is constructed.

3.6.6.2 *Cumulative Impacts*

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects developed in the Nevada portion of the Pahrump Valley would incorporate similar techniques as those of the Resources Integration Alternative to reduce environmental effects in the Pahrump Valley. As such, it is assumed that the construction of solar projects (Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea) would all be developed using overland travel for a portion of their construction. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley, see Table 3.2-3 for the total acreages of solar projects based on construction types. Overall, if the Resources Integration Alternative were implemented with the other solar developments in the Pahrump Valley, there would be reduced cumulative loss of carbon sequestration because approximately 12,000 acres of vegetation would be retained as compared with the cumulative scenario for the Proposed Action. However, it is unknown whether the Resources Integration Alternative cumulative projects would generate the same amount of renewable energy as the Proposed Action cumulative projects scenario. This is because, limiting grading to 20 percent of the cumulative projects' sites may effectively reduce the area of land where solar development is feasible, such as due to substantial topography or large washes which would not allow for construction under a strict grading limit. If the cumulative renewable projects under the Resources Integration Alternative resulted in less renewable energy, this would offset the benefit from the additional carbon sequestration. Retaining vegetation also improves vegetation community resiliency for adapting to climate change impacts, as compared to the Proposed Action cumulative effects.

3.6.7 No Action Alternative

Under the No Action Alternative, the solar facility, transmission line, and substation would not be developed. No surface disturbance would occur, and GHG would not be emitted. Climate change would continue as defined by current trends. No adverse effects would occur.

3.6.8 Project Design Features and Mitigation Measures

No Solar PEIS PDFs, plans, or mitigation measures were identified for GHG impacts from the Proposed Action nor Alternative 1. A Southern Nevada District Office PDF was identified for GHG impacts.

- SNDO PDF CC-1: Use SF_6 gas free equipment on site, where feasible.

3.6.9 Irreversible or Irretrievable Impacts

GHG emissions from the construction, operation, and maintenance of the Project (including potential SF_6 leaks from circuit breakers) would result in an increase in GHGs (relative to local, national, and/or global GHG emissions) that would occur for the duration of the Project. If the renewable energy made possible due to the Proposed Action offsets the use of fossil fuel generation, a decrease in the amount of GHGs from the generation of fossil fuels would occur.

3.7 Cultural Resources

3.7.1 Introduction

Cultural resources include prehistoric and historic-era archaeological sites, historic buildings, and structures (architectural), and the locations of important events in the past. They are physical phenomena (human-made and natural physical features) associated with past human activities or past and extant cultures that are, in most cases, finite, unique, fragile, and non-renewable. The BLM has used the NEPA substitution process to meet its Section 106 of the National Historic Preservation Act (NHPA) compliance requirements by identifying consulting parties through the NEPA scoping process (36 CFR § 800.8(c)(1)(i)); by identifying historic properties and assessing the effects of the undertaking on such properties in a manner consistent with the standards and criteria of 36 CFR§ 800.4 through 800.5; by consulting regarding the effects of the undertaking on historic properties with the SHPO per 36 CFR § 800.8(c)(1)(iii); by involving the public per 36 CFR § 800.8(c)(1)(iv); and by developing alternatives and proposed measures to avoid, minimize, or mitigate any adverse effects of the undertaking on historic properties per 36 CFR § 800.8(c)(1)(v).

While some cultural resources can be determined eligible for listing on the National Register of Historic Places (NRHP) and are termed Historic Properties, it must be stressed that cultural resources include all sites, not just historic properties, and that all sites may be subject to impacts as defined by NEPA.

3.7.2 Analysis Area

As defined under the implementing regulations for Section 106 of the NHPA, the *area of potential effects* (APE) is a geographic area or areas within which impacts from an undertaking may directly or indirectly affect historic properties that are listed in or eligible for listing in the NRHP (36 CFR § 800.16(d), (l)). The BLM, as the lead federal agency for Section 106 compliance, defined the APE in consultation with the Nevada State Historic Preservation Office (SHPO), Indian tribes, and other consulting parties. The APE considers potential physical (direct) and visual, auditory, and atmospheric (VAA) effects to historic properties from the construction, operation and maintenance, and decommissioning of the proposed Project. The physical APE includes the Project footprint (solar field, gen-tie route, access roads, lay-down yards, and any other ancillary facilities) and includes approximately 2,429 acres. The auxiliary power/telecommunications line would require one pole on the north of SR 160 increasing the physical APE to 2,429 acres. The VAA APE is defined as a 5-mile area extending from the Project site. The BLM defined the APE for the undertaking using the process identified in IM NV-2021-006 and the guide for Defining a Visual Area of Potential Effects to Historic Properties on BLM Lands in Nevada. BLM maintained the 5-mile APE based on the IM and supporting GIS viewshed analysis. The BLM also reviewed the APE's for projects of similar scale and scope in the immediate vicinity and in Southern Nevada more generally, including the Yellow Pine and Gemini Solar Projects. Both prior projects were similar in scale and scope, including use of photovoltaic technology. In these cases, the 5-mile area beyond the project site was used for the Section 106 analysis and was adequate to allow the BLM to consider effects to historic properties from the projects. The analysis area for cultural resources coincides with the entire APE (both physical and VAA) defined for the Project. This analysis area accounts for potential physical and visual, auditory, and atmospheric as well as indirect and cumulative impacts from implementation of the Project that could result in adverse effects to historic properties or impacts to cultural resources.

3.7.3 Affected Environment

The affected environment within the analysis area, as related to cultural resources, may be impacted by the proposed solar facility, and includes the contribution of past activities to existing conditions.

The analysis area is located in the Pahrump Valley immediately southeast of the town of Pahrump, Nevada. The Spring Mountains are located to the north and extend to the southeast. The Kingston Range is located to the south and the Nopah Range to the west. The valley contains many springs that were almost certainly used by prehistoric groups. These water sources later supported historic agricultural and ranching activities. The analysis area is characterized by southwest facing, dissected alluvial fans. Vegetation consists of Mojave Desert shrub dominated by creosote bush, burro bush and scattered yucca, and grasses. The human-built environment has modified the landscape over time and includes the divided highway corridor of SR 160, along with the parallel power line, and the unincorporated community of Pahrump northwest of the Project site.

The physical APE is located in Clark County and includes the proposed solar field (an area of 2,490 acres), plus the proposed 1.5 mile long gen-tie transmission line corridor (with an area of 33 acres), for a total of 2,523 acres.

The potential effects from the Proposed Action and Alternative 1 (Resources Integration Alternative) and associated linear facilities are discussed below. The findings of the Class III Cultural Resource Inventory Report prepared by SWCA Environmental Consultants (SWCA) in 2022—which included an archival literature review, a BLM Class III survey, and a visual assessment of the analysis area—are briefly summarized below.

SWCA documented 22 sites within the physical APE. The BLM Las Vegas Field Office (BLM) has made determinations of NRHP eligibility for all 22 resources and has sought Nevada SHPO concurrence (Table 3.7-1).

Table 3.7-1 Rough Hat Clark Solar Project Cultural Sites

Site numbers	Site description	NRHP determination	SHPO concurrence
26CK11188	Historic can scatter	Not Eligible	Pending
26CK11189	Historic can scatter	Not Eligible	Pending
26CK11190	Historic can scatter	Not Eligible	Pending
26CK11191	Historic can scatter	Not Eligible	Pending
26CK11192	Historic can scatter	Not Eligible	Pending
26CK11193	Historic can scatter	Not Eligible	Pending
26CK11194	Historic can scatter	Not Eligible	Pending
26CK11195	Historic can scatter	Not Eligible	Pending
26CK11196	Rock pile and historic cans	Not Eligible	Yes
26CK11197	Historic can scatter	Not Eligible	Pending

Site numbers	Site description	NRHP determination	SHPO concurrence
26CK11198	Possible prehistoric rock alignments	Not Eligible	Yes
26CK11199	Possible prehistoric cleared areas or intaglios	Not Eligible	Yes
26CK11200	Historic can scatter	Not Eligible	Pending
26CK11201	Historic can scatter	Not Eligible	Pending
26CK11202	Historic can scatter	Not Eligible	Pending
26CK11203	Possible prehistoric rock alignments	Not Eligible	Yes
26CK11204	Historic artifact scatter	Not Eligible	Pending
26CK11205	Rock pile and historic cans	Not Eligible	Yes
26CK11206	Historic can scatter	Not Eligible	Pending
26CK11207	Historic can scatter	Not Eligible	Pending
26CK11208	Historic can scatter	Not Eligible	Pending
26CK11209	Historic can scatter	Not Eligible	Pending

None of the 22 sites located in the physical APE was determined eligible for listing on the NRHP. Five of the sites were determined by BLM to be not eligible for listing in the NRHP under any Criteria (A–D), with SHPO concurrence. The BLM has also determined that 17 sites (all historic artifact scatters) are not eligible for listing on the NRHP and has requested SHPO concurrence with these determinations.

The APE for visual, auditory, or atmospheric effects (VAA APE) included the area within 5 miles of the proposed Project. A records search and literature review of the VAA APE identified 92 archaeological sites and no architectural resources within 5 miles of the proposed Project (Vicari et al., 2022). Of the sites within the visual resources APE, six (26CK11313, 26NY17526, 26NY17534, 26NY17981, 26NY17983, and 26NY17984) were previously determined eligible for the NRHP under Criterion D, one (26NY17535- a historic utility line) has been determined eligible by the BLM for the NRHP Under Criterion A and the balance of resources have been determined not eligible or are of unknown or unevaluated status. Section 3.7.5, Visual, Auditory and Atmospheric Analysis for Cultural Resources, describes these resources in more detail.

3.7.4 Environmental Consequences

This section discusses the potential direct, indirect, and cumulative impacts to important cultural resources that could result from construction, operation, and decommissioning of the proposed project under the Proposed Action, Alternative Action 1 (Resource Integration Alternative), and No Action Alternative. The analysis considers the Applicant Committed Environmental Protection Measures

(ACEMs) incorporated into the Proposed Action and alternatives to reduce potential project impacts. These measures are described in detail in the Plan of Development.

Methodology

Impacts to cultural resources can be direct, indirect, and cumulative. As defined under 36 CFR section 800.5(a)(1) (Criteria of Adverse Effect), an adverse effect occurs when a federal undertaking directly or indirectly alters any characteristics of a historic property that qualify it for NRHP listing. An adverse effect on a historic property is not limited to physical destruction or damage but may also include relocation of the property, changes in the character of the setting of the property, and the introduction of visual, atmospheric, or audible intrusions. Impacts from a federal undertaking that result in an adverse effect on a historic property may also include reasonably foreseeable effects caused by the undertaking that may occur later in time (i.e., indirect impacts). The BLM must determine whether the alteration of character-defining features of a historic property result in diminished aspects of integrity (i.e., location, design, setting, materials, workmanship, feeling, and association [NPS 1997]) to the extent that the degree of alteration would constitute an adverse effect under section 106 of the NHPA.

Visual effects result from changes to the aesthetic quality and/or value from modifications to the surrounding landscape. Sensitivity to visual effects for historic properties is based on the NRHP criteria under which the property is listed and the elements that contribute to its eligibility. Properties that qualify for listing on the NRHP under Criteria A, B, or C are eligible due to associative values including their association with significant events in the past, important people, or unique design characteristics. Resources that are listed in or eligible for listing in the NRHP can be susceptible to degradation of their historic setting through alterations to the surrounding landscape. Historic properties that qualify for NRHP listing under any of these three criteria typically demonstrate an important relationship with the surrounding environment, and they retain their historic character relative to their setting. Furthermore, the setting of a historic property may also retain characteristics of the historic environment, which can be impacted by modern intrusions or alterations to the landscape. Where the setting is important, it must be determined that the proposed project would cause a visual intrusion sufficient enough to diminish the characteristics of setting that make the property eligible. Where it does not contribute to the eligibility of the property, then effects to that setting are not important considerations.

Historic properties that are only important for their information potential (i.e., those that qualify under Criterion D) are not eligible for their setting and therefore are not affected by visual, atmospheric, or audible impacts. They may, however, still be adversely affected (as defined under Section 106) by physical (direct) impacts if located in areas where ground disturbance occurs. Therefore, historic properties within the visual resources APE that qualify under Criteria A, B, or C are analyzed in terms of visual impacts.

3.7.5 Proposed Action

Construction Impacts

Construction under the Proposed Action would result in the disturbance of up to approximately 1,950 acres, all of it in Clark County. This includes up to 2 acres required for the auxiliary power/telecommunications line north of SR 160. A portion of this area has been surveyed for the GridLiance Project. For all ground disturbance in this area, Solar PEIS PDF CR2-1 would require monitoring ground-disturbing activities in cases where there is a probability of encountering cultural resources during construction as would be the case at this pole location. The BLM has determined, with SHPO concurrence, that two historic-era sites (26CK11196 and 26CK11205) composed of rock piles and debris scatters, three prehistoric sites (26CK11198, 26CK11199, and 26CK11203) composed of rock alignments and cleared areas, and the 18 isolated occurrences of artifacts and/or features identified in the Project physical APE are not eligible for the NRHP. The BLM has also determined that the other 17 historic era can and debris scatter sites are not eligible for listing on the NRHP and continues to consult with SHPO under 36 CFR 800.8(c)(1)(ii). Based on these determinations, the BLM finds that there will be no effect to historic properties within the physical APE under NHPA. However, these cultural resources will be impacted by construction of the Project.

Construction activities would introduce temporary, non-physical changes to the surrounding area due to increased noise from heavy equipment and an increase in construction-related traffic both in and within the vicinity of the Project site. These atmospheric and audible changes to setting would be short term and last only the duration of construction and would not diminish the integrity of any of the historic properties located outside the Project physical APE under the Proposed Action to the extent that they no longer qualify (or may qualify if presently unevaluated) for NRHP listing.

As part of the construction of the Project, the Applicant would comply with the Solar PEIS PDFs CR1-1 and CR 2-1, which require coordination with the BLM to minimize cultural resources impacts, including consultation with other federal, tribal, state, and local agencies. It also requires appropriate training/educational programs for the solar company workers, including the construction workforce, and employing cultural field monitors (appropriate for the resource anticipated) to monitor ground-disturbing activities in cases where there is a probability of encountering cultural resources during construction. CR 2-1 requires appropriate measures for any unexpected discovery of cultural resources during construction and, potentially, archaeological monitors, which will be accomplished through the development of a Plan for Post-Review Discoveries and Unanticipated Adverse Effects.

Operation and Maintenance Impacts

There would be no direct effects to historic properties from Project operation and maintenance under the Proposed Action for the reasons discussed above for the construction phase. As with construction, PDFs CR-1 and CR-2 would be required and would reduce impacts to cultural resources during operation and maintenance of the Project.

Visual, Auditory and Atmospheric Analysis for Cultural Resources

The Project APE was delineated to ensure the identification of historic properties that may be directly affected by the proposed Project and that are listed in or may be eligible for inclusion in the NRHP. The APE was defined in accordance with 36 CFR 800.4(a) and includes areas that could be affected by the maximum extent of the proposed Project-related ground disturbance, including all construction staging areas, access roads and any temporary construction easements. The APE also includes areas where historic properties have the potential to be affected by the introduction of visual, auditory, or atmospheric elements of the proposed Project. The APE for visual, auditory, or atmospheric effects (VAA APE) includes the area within 5 miles of the proposed Project. A records search and literature review of the VAA APE identified 92 archaeological sites and no architectural resources within 5 miles of the proposed Project (Vicari et al., 2022). The results of this study were used in concert with the Project's Visual Resources Technical Report (VRTR) (Panorama 2023) to analyze all potential visual, auditory, and atmospheric impacts created by the Project. The parameters for the study created by that analysis are used here to determine potential effects to any historic properties in the Project APE.

Auditory Methodology: A 75-foot APE around the Project and Project-specific access routes was deemed sufficient for identifying any potential auditory effects, as no extreme activities like blasting or oversized equipment are proposed that would create impactful noise levels.

Atmospheric Methodology: Atmospheric effects include any additions to the atmosphere that are produced by the operation of the Project. Any atmospheric additions would need to be considered in relation to the current levels within the APE. The VRTR reviewed changes in the atmospheric setting during the contrast rating process. A comparison of the images collected by Panorama on July 12, 2022 (Panorama 2023, Appendix B) and by Truescape on July 12-14, 2022 (Panorama 2023, Appendix C) from the same locations but at different times illustrate the variable atmospheric conditions that occur in the region. For example, cloud cover is visible in many of the photographs taken by Truescape, which was not present or as prominent at the time photographs were taken by Panorama. The clouds, shadows cast by the clouds on the valley floor, lower lighting conditions, and general atmospheric haze visible in some of the baseline photos used in the simulations tended to reduce visibility and the level of detail that can be seen as distance increases, which is consistent with the real-world viewing conditions. When completing the contrast rating, the baseline viewing conditions represented in both sets of photographs were considered. The level of contrast was determined with the assumption that during clearer conditions contrast resulting from the Project would be greater from some points of view. For these, the visual simulations show significant cloud shadows where the Project site would be located and dark solar panels that are depicted tend to blend into the landscape more than they would when the shadows were absent, due to the diminished contrast in color and texture. Therefore, what may be considered low contrast was increased to moderate contrast for these parameters to account for contrasts that would likely result during clearer viewing conditions, as depicted in the alternate baseline photographs.

Air quality in the area appears to be fairly good with consideration of the highways. The Project is designed to generate clean energy and as such would not substantially change the air quality. Construction of the Project would temporarily increase pollutants, including dust and emissions from equipment during construction. This increase would be localized to the area of the APE and occur during the construction of the Project only. Atmospheric effects from the proposed construction methodology are assumed to be negligible (Vicari, et al. 2022).

Visual Methodology: To assess visual effects to historic properties, an analysis of the proposed final design, related specifically to archaeological and built environment resources, was conducted to determine if any facilities would be introduced that would have an adverse effect to the setting of a previously determined or recommended-eligible historic property. The BLM's Visual Resource Management (VRM) system provides the foundation for defining distance zones based on relative visibility from travel routes or observation points, as described in Manual H-8410-1, Visual Resource Inventory (BLM 1986a). The BLM typically defines distance zones as Foreground/Middleground (less than 3–5 miles), Background (3–5 miles, up to a maximum of 15 miles based on atmospheric conditions), and Seldom Seen (portions of the landscape that are not visible or typically distances greater than 15 miles). The foreground and middle-ground extend up to 5 miles from a proposed project and include the extent to which the introduction of a project could cause a strong to moderate contrast and result in an adverse effect to historic properties. While views of Proposed Action would be visible beyond a 5-mile area extending from the Project site, they would not be expected to attract the attention of casual viewers as indicated by the Visual Simulations of KOP 5, 6, 13, and 14, shown in Appendix C.2 of the Visual

Resources Technical Report. BLM is using the standard of attracting casual viewers, because this would determine whether the project would cause alterations in the character or use of historic properties. These definitions are used as a framework for the contrast analysis in the Project's VRTR (Panorama 2023) and the current study.

The VRTR includes viewshed studies for each of the major project components (400-megawatt solar power generating facility, energy storage system, access roads, electrical distribution lines, communication cables, operation and maintenance (O&M) facilities, new substation, and a 230 kV transmission line into the Gridliance Trout Canyon Substation) out to 15 miles from each component to illustrate where in the surrounding landscape the project components would theoretically be visible. The solar arrays would be 15 feet at maximum height. The model indicates where theoretical direct line-of-site views may occur between terrain locations and observer points used to represent the locations and heights of project components. The model is based on elevation and landform and does not account for vegetation, existing structures, and other landscape elements that could obstruct views (Panorama 2023).

Adverse effects to historic properties could occur within the close zones (i.e., foreground/ middleground), so the 5-mile radius VAA APE was established for analysis. The BLM also used the results of the VRM study to help analyze visual impacts to cultural resources. While it is possible that the Project may be visible beyond 5 miles, its visibility has been determined not to be a visual intrusion that could affect historic properties or cultural resources. Resources that have previously been evaluated as eligible for inclusion in the NRHP, and with visual contributions to their overall eligibility, were considered with this 5-mile APE. Any resources that were previously determined not eligible or have unknown/unevaluated status were excluded. A Visual Contrast Rating (VCR) system (as defined in Sullivan, et al., 2018 and Wyoming BLM, 2006, App. C, pp. 2-4) was used to determine the degree of contrast of the proposed undertaking on the setting of any historic properties within this 5-mile radius. The VCR uses four categories of contrast analysis:

- ***No Contrast*** occurs when the project elements will not be seen from the historic property and/or there is no change in the form, line, color and texture between the undertaking and the setting. With *No Contrast*, no historic properties are affected.
- ***Weak Contrast*** occurs when the proposed project elements, or portions of the elements, can be seen but will not dominate the setting or attract the attention of the casual observer because the basic elements of form, line, color, and texture found in the setting are repeated in the project's physical elements. With *Weak Contrast*, there is no adverse effect to historic properties.
- ***Moderate Contrast*** occurs when the proposed project elements, or portions of the elements, begin to attract attention and begin to dominate the characteristic landscape. With *Moderate Contrast*, there is an adverse effect to historic properties.
- ***Strong Contrast*** occurs when the proposed project elements, or portions of the elements, demand attention, cannot be overlooked, and are dominant on the landscape. With *Strong Contrast*, there is an adverse effect to historic properties.

The VCR conforms to the four zone distances described in the VRM/VRTR that were utilized to determine effects to the historic properties' viewshed. These four zones are summarized here:

- **Foreground**: zone of distance nearest to viewer location in which changes to the view are dominant and create the greatest contrast.

- **Middleground:** zone of distance between foreground and background in which detail is still apparent.
- **Background:** zone of distance far from viewer location in which the human eye typically does not perceive line or texture and only sees outlines of form and splashes of color.
- **Distant Background:** zone of distance furthest from viewer location, detail will not be visible.

Auditory Analysis

Two (2) resources occur within a 75-ft buffer around the proposed areas of ground disturbance (see Table 3.7-2). Both were previously determined not eligible for NRHP inclusion under any criteria so are not considered in this analysis. No historic properties then exist within the auditory effects area.

Visual Analysis

One hundred thirty-seven (137) resources are within the 5-mile radius used for the VAA effects analysis (see Table 3.7-2). This number includes the resources identified in the Vicari et al. (January 2022) report, the results of the Copper Rays studies (which was being done concurrently with the Rough Hat Clark studies), and an additional NVCRIS search to capture any final in-process resources and other resources that may have been documented for other studies being conducted concurrently. Twenty-five (25) are isolated finds and 20 are historic age cadastrals, so were removed from VCR consideration which left 92 resources. The foreground/middleground zones established in the VCR were overlaid with the remaining 92 resource locations to determine if they would be affected by the proposed Project. Eighty-six (86) of these resources are located within the 5-mile study and are within the foreground/middleground zones. Seventy (70) of the 86 were determined not eligible for inclusion in the NRHP and nine resources are unknown or unevaluated for the NRHP within the foreground/middleground VCR area; these 79 resources were thus excluded from consideration of effects. As such, of these 92 resources, only 7 are eligible or listed in the NRHP.

Of the 7 resources, 6 resources (26CK11313, 26NY17526, 26NY17534, 26NY17981, 26NY17983, and 26NY17984) were determined eligible for the NRHP under Criterion D only for their potential to yield significant data. One site (26NY17535), a historic utility line, is within the VAA APE and has been determined eligible by the BLM for the NRHP under Criterion A, however, visual setting is not a contributing factor in the NRHP eligibility of utility lines, which are functional by design.

Visual, Auditory, and Atmospheric Effects Conclusion

No NRHP-eligible historic properties where visual setting is a significant element for their eligibility were identified in the VCR analysis or within the foreground/middle ground 5-mile VAA effect APE. Any historic properties outside the foreground/middleground areas of the 5-mile APE are considered to have a “No Contrast” or “Weak Contrast” level with no or minimal change in the form, line, color, and texture between the proposed project and the existing setting. As such the proposed project would not dominate the existing setting or attract the attention of an observer from those resource areas. The proposed Project would have no adverse effect to historic properties within the VAA APE.

Table 3.7-2. Historic Properties considered in the VAA Analysis

Site Number	Age	Description	NHRP Status	Foreground/ Middleground	Auditory Consideration	Potential Effect(s)
26CK11313	Prehistoric	Lithic scatter	Eligible, D	Yes	No	No Adverse Effect
26NY17526	Prehistoric	Rock rings, 3 pot drops, and cradle board rest	Eligible, D	Yes	No	No Adverse Effect
26NY17534	Prehistoric	Rock ring, FAR, and prehistoric artifact scatter	Eligible, D	Yes	No	No Adverse Effect
26NY17535	Historic	Historic 1965 powerline with associated trash for Pahrump	Eligible A, SHPO concurrence pending	Yes	No	No Adverse Effect
26NY17981	Prehistoric	Lithic scatter	Eligible, D	Yes	No	No Adverse Effect
26NY17983	Prehistoric	Lithic scatter	Eligible, D	Yes	No	No Adverse Effect
26NY17984	Prehistoric	Lithic scatter	Eligible, D	Yes	No	No Adverse Effect

Decommissioning Impacts

Under the Proposed Action, Project decommissioning activities would entail removal of the solar array and associated facilities and reclamation of the site to pre-Project conditions (to the extent practicable). Because the decommissioning activities would occur within the same footprint of the construction activities, and there are no historic properties within the physical APE, and no NRHP-eligible historic properties where setting is a significant element for their eligibility were identified in the VAA APE, so decommissioning of the Project would have no effect to historic properties.

During decommissioning, the Project would be subject to Solar PEIS PDFs CR 3-1, which requires planning for treatment of any historic properties, and PDF CR 3-3, which requires the Applicant to confine soil-disturbance activities to previously disturbed areas.

Cumulative Impacts

There are no historic properties within the physical APE, and no NRHP-eligible historic properties where setting is a significant element for their eligibility in the VAA APE, so there are no effects to historic properties anticipated from the Proposed Action. Therefore, the Proposed Action would not contribute to cumulative effects to historic properties.

3.7.6 Alternative 1 – Resources Integration Alternative

Construction and Operations and Maintenance Impacts

Impacts to historic properties from construction activities under Alternative 1 would be consistent with those described above under the Proposed Action because the location of Alternative 1 would be the same. While Alternative 1 would leave more vegetation in place because it would entail fewer acres of grading and would have a threshold for effects to perennial vegetation, the overall visual effects of Alternative 1 would be the same as those from the Proposed Action due to the scale of the Project.

Cumulative Impacts

As with the Proposed Action, adverse effects on historic properties within the physical APE from Alternative 1 are not anticipated. Therefore, Alternative 1 would not contribute to cumulative direct effects to historic properties.

3.7.7 No Action Alternative

Under the No Action Alternative, the solar field, gen-tie line, energy storage system, and associated linear facilities would not be developed because the BLM would not issue the ROW grant. No ground disturbance would occur, and there would be no changes or alterations to the landscape. Therefore, there would be no effects to historic properties. Existing conditions in the analysis area would continue.

3.7.8 Project Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) are listed in Appendix B. The Project would comply with the following Solar PEIS PDFs to minimize adverse impacts to cultural resources:

Solar PEIS Programmatic Design Features

- CR 1-1: Project developers shall coordinate with the BLM early in the planning process to identify and minimize cultural resource impacts; the BLM shall consult with other federal, tribal, state, and local agencies as appropriate.
- CR 2-1: Solar facilities shall be characterized, sited and designed, and constructed in coordination with the BLM to minimize cultural resource impacts.
- CR 3-1: Prior to reclamation activities, the BLM may require further planning for treatment of historic properties or planning for mitigation addressing reclamation activities.
- CR 3-3: Project developers shall confine soil-disturbing reclamation and decommissioning activities to previously disturbed areas. Known historic properties shall be avoided during these activities.

Required Plans and Mitigation Measures

- Plan for Post-Review Discoveries, and Unanticipated Adverse Effects

3.7.9 Irreversible and Irretrievable Impacts

No historic properties are present within the Physical APE and those historic properties within the VAA APE would not be affected by the proposed project. Thus, there can be no irreversible or irretrievable impacts.

3.8 Environmental Justice

3.8.1 Introduction

This section analyzes the impacts of the Proposed Action and alternatives on the environmental justice issues identified during scoping. 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, low-income, and Native American populations. Executive Order 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, which was released on April 21, 2023 and provides additional guidance for advancing environmental justice, was also considered in this review.

3.8.2 Analysis Area

The analysis area for environmental justice screening encompasses cities and census designated places (CDPs) within 55 miles of the Project site, the Moapa River Indian Reservation, and census tracts that fall partially or wholly within 6 miles of the Project site or within the SR 160 corridor between Pahrump CDP and Las Vegas (shown in Figure 3.8-1 in Appendix D). The 55-mile analysis area conservatively represents the densely populated communities that could experience construction impacts due to temporary worker commute trips, hauling of construction equipment or debris, and permanent impacts due to operational worker commute trips. The analysis for the 55-mile-proximity communities and Moapa River Indian Reservation uses the state of Nevada as the geographic reference area. The state of Nevada is used as the geographic reference area due to the broad range of communities within the 55-mile radius, including the presence of urban, suburban, and rural communities. The 6-mile-radius and SR 160 corridor analysis area is intended to account for low-density and rural settings proximate to the Project site that could experience construction impacts similar to those within the 55-mile analysis area as well as other construction and operational impacts associated with dust, noise, air quality, and aesthetics. That analysis, therefore, uses non-metropolitan Nevada[1] as the reference area (Headwater Economics 2022). The environmental justice analysis includes communities within Inyo County, California, and Nye and Clark counties, Nevada. Approximately 19 densely populated communities are within 55 miles of the Project area, including, but not limited to, Las Vegas and Pahrump CDP. The Moapa River Indian Reservation is outside the 55-mile analysis area, but still included in the analysis. The Las Vegas Paiute Tribe's Snow Mountain Reservation is the nearest Indian reservation and included in the 55-mile analysis area. Within 55 miles of the Project site, 26 census tracts were identified for analysis. The minority, indigenous, and low-income population thresholds for Nevada and non-metropolitan Nevada are presented in Table 3.8-1. The percentage of low-income, indigenous, and minority populations within the 26 census tracts and 18 communities were evaluated, as shown in Table 3.8-2 and Table 3.8-3 and further detailed in Table 3.8-4 , and are further detailed in Appendix D.

[1] The data for non-metropolitan Nevada was sourced from a demographic profile produced by Headwaters Economics' Economic Profile System.

3.8.3 Affected Environment

Environmental Justice Communities

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 human health conditions of minority and low-income communities and calls on agencies to achieve environmental justice as part of its mission. The purpose of the environmental justice screening analysis is to determine whether low-income, minority, and/or Native American populations exist within the potential analysis area of the proposed Project. A minority population is defined as one in which the “White alone, non-Hispanic” population subtracted from 100 percent is 50 percent or greater (threshold analysis) or meets or exceeds 110 percent of the minority percentage of the reference community population (meaningfully greater analysis) (BLM 2022). A low-income population is a population in which the percent of people in the study area are living at or below 200 percent of the poverty line is equal to or greater than 50 percent (50 percent threshold analysis), or has a low-income percentage of the population equal to or higher than the reference area (low-income threshold analysis) (BLM 2022). Native American communities of concern are present if the percentage of the population identified as belonging to a Native American community is equal to or greater than the reference population. Environmental justice communities are present in the analysis area, as shown in Table 3.8-2 and Table 3.8-3.

In the communities within 55 miles of the Project area, the largest minority populations occur in Las Vegas, North Las Vegas, the Moapa River Indian Reservation, Baker CDP, Las Vegas Paiute Tribe’s Snow Mountain Reservation, and Amargosa Valley CDP. These communities meet the threshold analysis and meaningfully greater analysis criteria for a minority population. The Furnace Creek CDP, Tecopa CDP, Amargosa Valley CDP, Baker CDP, Goodsprings CDP, Indian Springs CDP, Las Vegas, North Las Vegas, Pahrump CDP, Sandy Valley CDP, and Moapa River Indian Reservation are considered low-income populations.

As discussed above, census tracts wholly or partially within a 6-mile radius of the Project site or along the SR 160 corridor between Pahrump CDP and Las Vegas represent low-density or rural settings proximate to the Project site. Therefore, analysis for those areas uses non-metropolitan Nevada as the geographic reference area. Approximately, 20 census tracts meet the criteria of a minority population, and 8 census tracts meet the criteria of a low-income population. In the census tracts wholly or partially within 6 miles of the Project area, the largest minority populations occur in Census Tract 8, Inyo, CA; Census Tracts 28.10, 28.28, 28.37, 29.02, 29.78, 29.83, 29.85, 58.18, 58.29, 58.30, 58.31, 58.34, 58.57, 58.58, 58.66, and 58.77, Clark County, NV; and Census Tracts 9604.07, 9604.09, and 9604.10. The census tracts that meet the criteria of a low-income population include Census Tract 8, Inyo County, CA; Census Tracts 28.10, 58.18, and 58.76, Clark County, NV; and Census Tracts 9604.05, 9604.07, 9604.12, and 9604.14, Nye County, NV.

In the communities within 55 miles of the Project area, Native American communities occur in Furnace Creek CDP, Tecopa CDP, Amargosa Valley CDP, Blue Diamond CDP, Pahrump CDP, Moapa River Indian Reservation, and the Las Vegas Paiute Tribe’s Snow Mountain Reservation. Approximately 7 census tracts meet the criteria for a Native American community. The largest Native American populations within 6 miles of the Project area include Census Tract 8, Inyo, CA, Census Tracts 28.37, 58.77, 75, Clark County, NV, and Census Tracts 9604.05, 9604.09, and 9604.12, Nye County, NV.

Table 3.8-1 Summary of Low-income and Minority Thresholds in the Project Area

Geographic reference area	Low-income threshold	Minority meaningfully greater threshold (110% of reference population or greater than 50%)	Indigenous community threshold
Nevada	31.2%	50.0%	2.5%
Non-metro Nevada	28.0%	30.2%	4.9%

Table 3.8-2 Summary of Low-income and Minority Populations for Communities within the Project 55-mile Buffer Analysis Area (compared to Nevada data)

Community	Percent low-income	EJ low-income population?	Percent minority	EJ minority population?	Percent indigenous	EJ indigenous population?
Charleston View CDP	0.0	No	0.0	No	0.0	No
Furnace Creek CDP	38.8	**Yes**	38.8	No	14.6	**Yes**
Shoshone CDP	0.0	No	0.0	No	0.0	No
Tecopa CDP	43.5	**Yes**	35.9	No	19.6	**Yes**
Amargosa Valley CDP	**63.9**	**Yes**	59.4	**Yes**	6.6	**Yes**
Baker CDP	60.8	**Yes**	88.9	**Yes**	0.0	No
Blue Diamond CDP	24.4	No	4.4	No	4.3	**Yes**
Boulder City	25.7	No	15.6	No	1.6	No
Goodsprings CDP	100.0	**Yes**	0.0	No	0.0	No
Henderson	20.6	No	39.6	No	1.6	No
Indian Springs CDP	40.2	**Yes**	39.2	No	0.0	No
Las Vegas	34.4	**Yes**	57.9	**Yes**	2.1	No
Mount Charleston CDP	18.6	No	19.5	No	0.0	No
North Las Vegas	34.9	**Yes**	76.0	**Yes**	2.3	No
Pahrump CDP	35.4	**Yes**	27.5	No	3.1	**Yes**
Sandy Valley CDP	38.6	**Yes**	20.0	No	0.0	No
Summerlin South CDP	15.2	No	34.3	No	0.8	No

Community	Percent low-income	EJ low-income population?	Percent minority	EJ minority population?	Percent indigenous	EJ indigenous population?
Moapa River Indian Reservation	62.8	**Yes**	95.8	**Yes**	80.4	**Yes**
Las Vegas Paiute Tribe	16.2	No	94.6	**Yes**	85.6	**Yes**

Sources: (United States Census Bureau 2021; United States Census Bureau 2020; United States Census Bureau 2021; United States Census Bureau 2020; Headwater Economics 2022)

Notes:

1. A minority population is a population where everyone other than a non-Hispanic white person is 50 percent or greater or is meaningfully greater than the general population in the state. *Meaningfully greater* is defined as meeting or exceeding 110 percent of the minority reference population.
2. A low-income population is a population where 50 percent or greater of the population is living at or below 200 percent of the poverty line or has a low-income percentage that is equal to or greater than the reference area.
3. 2020 demographic and poverty data were utilized for Charleston View since 2021 data was unavailable.
4. An indigenous community is present if the percentage of the population identified as belonging to an indigenous community is greater than that of the reference population.

Table 3.8-3 Summary of Low-income and Minority Populations for Census Tracts within the Project 6-mile Buffer Analysis Area (compared to non-metro Nevada data)

Census tract	Percent low-income	EJ low-income population?	Percent minority	EJ minority population?	Percent indigenous	EJ indigenous population?
Census Tract 8, Inyo County, California	38.2	**Yes**	49.6	**Yes**	10.8	**Yes**
Census Tract 28.10, Clark County, Nevada	33.7	**Yes**	67.4	**Yes**	2.6	No
Census Tract 28.28, Clark County, Nevada	22.2	No	51.6	**Yes**	0.7	No
Census Tract 28.37, Clark County, Nevada	21.1	No	39.5	**Yes**	6.4	**Yes**
Census Tract 29.02, Clark County, Nevada	24.1	No	77.6	**Yes**	0.3	No

Census tract	Percent low-income	EJ low-income population?	Percent minority	EJ minority population?	Percent indigenous	EJ indigenous population?
Census Tract 29.78, Clark County, Nevada	19.1	No	57.8	**Yes**	0.6	No
Census Tract 29.83, Clark County, Nevada	25.7	No	71.6	**Yes**	1.1	No
Census Tract 29.85, Clark County, Nevada	21.0	No	57.8	**Yes**	4.3	No
Census Tract 58.18, Clark County, Nevada	40.2	**Yes**	68.7	**Yes**	4.7	No
Census Tract 58.29, Clark County, Nevada	20.7	No	55.5	**Yes**	0.3	No
Census Tract 58.30, Clark County, Nevada	26.5	No	70.2	**Yes**	2.9	No
Census Tract 58.31, Clark County, Nevada	15.0	No	60.0	**Yes**	0.2	No
Census Tract 58.34, Clark County, Nevada	14.8	No	55.2	**Yes**	1.3	No
Census Tract 58.57, Clark County, Nevada	29.0	No	53.8	**Yes**	0.6	No
Census Tract 58.58, Clark County, Nevada	23.0	No	56.7	**Yes**	1.4	No
Census Tract 58.66, Clark County, Nevada	13.4	No	62.0	**Yes**	1.2	No

Census tract	Percent low-income	EJ low-income population?	Percent minority	EJ minority population?	Percent indigenous	EJ indigenous population?
Census Tract 58.76, Clark County, Nevada	41.4	**Yes**	19.1	No	0.0	No
Census Tract 58.77, Clark County, Nevada	30.0	No	50.2	**Yes**	4.9	**Yes**
Census Tract 75, Clark County, Nevada	17.5	No	24.0	No	5.8	**Yes**
Census Tract 9604.05, Nye County, Nevada	45.1	**Yes**	25.1	No	5.8	**Yes**
Census Tract 9604.07, Nye County, Nevada	48.1	**Yes**	34.9	Yes	3.0	No
Census Tract 9604.08, Nye County, Nevada	27.8	No	12.2	No	1.4	No
Census Tract 9604.09, Nye County, Nevada	23.4	No	44.2	**Yes**	5.5	**Yes**
Census Tract 9604.10, Nye County, Nevada	27.1	No	30.4	**Yes**	1.8	No
Census Tract 9604.12, Nye County, Nevada	30.8	**Yes**	23.8	No	8.8	**Yes**
Census Tract 9604.14, Nye County, Nevada	64.9	**Yes**	7.9	No	2.0	No

Sources: (United States Census Bureau 2021; United States Census Bureau 2020; United States Census Bureau 2021; United States Census Bureau 2020; Headwater Economics 2022)

Notes:

1. A minority population is a population where everyone other than a non-Hispanic white person is 50 percent or greater or is meaningfully greater than the general population in the state. *Meaningfully greater* is defined as meeting or exceeding 110 percent of the minority reference population.
2. A low-income population is a population where 50 percent or greater of the population are living at or below 200 percent of the poverty line or has a low-income percentage that is equal to or greater than that of the reference area.
3. An indigenous community is present if the percentage of the population identified as belonging to an indigenous community is greater than that of the reference population.

3.8.4 Environmental Consequences

Methodology

The effects analysis for the Project considers whether environmental justice populations are present in the analysis area, whether the Proposed Action or alternative would have the potential to adversely affect these communities disproportionately and, if so, how.

3.8.5 Proposed Action

Construction Impacts

Any Project-related impacts could affect those minority, Native American, and low-income populations described in the affected environment, above.

Adverse ecological, cultural, human health, economic, or social impacts are not anticipated to be disproportionately higher for the minority, Native American, or low-income populations further away from the Project site. The communities with environmental justice populations that would not be disproportionally affected by Project construction due to their distance from the Project area include Las Vegas, North Las Vegas, the Moapa River Indian Reservation, Baker, Amargosa Valley, Furnace Creek, Tecopa, Goodsprings, Indian Springs, Sandy Valley, the Las Vegas Paiute Tribe, and Blue Diamond CDP. The nearest of these communities to the Project area is Sandy Valley, which is approximately 17 miles southeast of the Project site. Due to the distance of the Project area from these communities, Project construction would not be visible from these communities. Additionally, dust generated during construction is not anticipated to disproportionally effect communities farther away from the Project site due to the implementation of dust control measures and the distance between these populations and the Project area. Construction of the Project would affect approximately 1,950 acres of suitable habitat for wildlife. Environmental justice communities further away from the Project site would have access to additional wildlife habitat areas. The Project would alter an area of natural habitat; however, adverse effects to sensitive species would be minimized and mitigated to the extent possible. One identified unpaved recreational trail crosses the Project site, as described in Section 3.10 Recreation. The trail use is low, and closure would not substantially affect environmental justice communities, due to their distance from the Project site, and the availability of recreational trails closer to their communities.

Adverse ecological, cultural, human health, economic, or social impacts would be disproportionately and adversely higher for the minority, Native American, or low-income populations in Pahrump CDP and census tracts within 6 miles of the Project area due to their proximity to the Project area. The Pahrump CDP and census tracts would experience potential impacts, including noise, dust, traffic, or other nuisances, from temporary construction-worker routes. The Project would be required to implement Solar

PEIS PDF EJ1-1 which recommends developing and implementing focused public information campaigns to provide technical and environmental health information directly to low-income and minority groups or to local agencies and representative groups. PDF EJ1-1 recommends including key information such as any likely impact to air quality, drinking water supplies, subsistence resources or public services and the relevant preventative/minimization measures that may be taken. As part of implementing PDF EJ 1-1 and as part of the EJ Outreach Plan, the BLM created a cumulative effects packet and provided targeted information to community centers where EJ communities could get information on the Project. However, the Solar PEIS does not include any mitigation that avoids or minimizes disproportionate and adverse impacts to environmental justice communities. Mitigation measure EJ-1 would be recommended with the goal of increasing local hiring which could potentially provide a benefit to the local EJ communities.

- **Air Quality**: As discussed in Section 3.3: Air Quality, Project construction would exceed NAAQS/SAAQS for PM_{10} due to the generation of fugitive dust emissions. Environmental justice communities would experience adverse air quality impacts as they may not have the ability to relocate or mitigate fugitive dust emissions within their homes. Dust and tailpipe emissions from vehicle traffic during Project construction would be mitigated through the application of best management practices outlined in the Dust Control and Air Quality Plan required as part of the BLM ROW grant, and disturbed areas would be watered to suppress dust. The Project would also implement Solar PEIS PDF AQC1-2 and MM Air-1 which requires projects to identify measures to minimize air quality impacts. However, adverse impacts on environmental justice communities from construction would remain.
- **Traffic**: The Traffic Impact Analysis assumed 60 percent of the traffic generated by the Proposed Action would travel along SR 160 from the Las Vegas metropolitan area and 40 percent would travel along SR 160 from the Pahrump Valley. Construction of the Proposed Action would temporarily increase traffic in the area by 6 percent. As discussed in Section 3.13: Transportation and Traffic, APM Transport-1 would be implemented, which includes traffic control measures to reduce hazards for incoming and outgoing traffic from the Project site. Traffic impacts from construction would not disproportionately affect environmental justice communities.
- **Wildlife**: Construction of the Project would remove wildlife habitat and corridors. For communities within 6 miles of the Project site, the loss of wildlife habitat would reduce the access and availability to nearby open spaces, as well as access for potential food and resource gathering for environmental justice communities. PDF ER2-1 requires the preparation of a Restoration-Revegetation & Decommissioning Reclamation Plan required as part of the BLM ROW grant that would restore native plant communities in areas of temporary disturbance. While PDF ER2-1 would require restoration of the Project site, impacts to environmental justice communities from wildlife habitat removal during the 30-year life of the project would remain adverse.
- **Recreation:** While the one recreational trail that crosses the site has very low usage, closure of the recreational trail that crosses the Project site would limit recreational opportunities for environmental justice communities within 6 miles of the Project area. Additionally, construction of the Project would remove hunting opportunities across the 2,469-acre site. Ample recreational trails and hunting opportunities are available in Pahrump Valley that would be accessible to environmental justice communities. Therefore, Project-specific adverse recreational impacts would not disproportionately and adversely affect environmental justice communities.

- **Visual Resources:** As discussed in Section 3.17 Visual Resources, construction of the Project would result in contrast and adverse visual impacts associated with the visibility of ground disturbance, vegetation removal, dust generation, equipment movement and vehicle traffic, material and equipment staging, and the installation of proposed facilities. Solar PEIS PDFs VR1-1, VR2-4, VR4-1, VR2-3, and VR3-1 would be implemented to reduce the visual contrast of the Proposed Action. Despite the implementation of the Solar PEIS PDFs, the permanent visual change to the Pahrump Valley would disproportionately and adversely affect environmental justice communities.
- **Water Resources**: As discussed in Section 3.6: Water Resources, 800 acre-feet per year of groundwater water would be used for dust control during construction. The groundwater would be sourced from an overallocated groundwater basin that could have an adverse effect to other nearby well users or groundwater-dependent springs and vegetation. Low-income communities may not have the means to obtain or purchase water from other water sources, if the overallocated groundwater basin results in drawdowns to local wells. The Project would implement Solar PEIS PDF WR1-3 which requires the consideration of water conservation measures related to solar energy technology to reduce Project water requirements. Adverse water resource impacts would disproportionately affect environmental justice communities.
- **Cultural Resources**: The Project would permanently disturb up to 1,767 acres of land in Clark County. No historic properties, sacred sites, or Traditional Cultural Properties were identified in the Project area. The Project area is near mountain ranges with tribal significance. Due to the significance of the landscape surrounding the Project site to tribal communities, disproportionate impacts to environmental justice communities (i.e., Moapa Rive Indian Reservation and Las Vegas Paiute Tribe) would occur.
- **Land Use and Realty**: The Project would not conflict with existing land use programs, plans, policies, or authorizations. Construction of the Project would increase vehicle traffic along regional transportation corridors. The increase in vehicle traffic would have regional traffic impacts and would not disproportionately affect environmental justice communities. Specially designated areas are at a sufficient distance such that the Project site would avoid impacts to land use effects. Land use and realty impacts would not have disproportionate impacts on environmental justice communities.
- **Public Health and Safety**: Construction of the Project would use, store, and dispose of hazardous materials. Hazards associated with accidents and spills during construction would be short-term and localized. Because of the small quantities of hazardous materials that would be used, impacts to environmental justice communities would not occur. Ground disturbance activities would generate fugitive dust that could expose environmental justice communities to Valley Fever, a fungus found in desert soils. The occurrences of valley fever in Clark County are also low and as discussed above, fugitive dust emissions would be addressed in a Dust Control and Air Quality Plan that would minimize public exposures to dust emissions, and thereby minimize exposure to Valley Fever. Solid waste generated during construction would not exceed the capacity of local landfills. Emergency evacuation for environmental justice communities in the event of a wildfire could be more difficult along SR 160. Solar PEIS PDF HMW 1-1 requires the preparation of an Emergency Response Plan to identify evacuation routes, communication protocols, and notifications. Solar PEIS PDF WF 1-1 requires the implementation of fire management measures that identify minimize fire risk, and PDF WF 2-1 further reduces on-site fire risks by requiring vegetation management. With implementation of Solar PEIS PDFs HMW 1-1, WF 1-1, and WF 1-2, the Proposed Action would not result in adverse effects to environmental justice communities from an increase in the risk of wildfire.

Operation and Maintenance Impacts

Due to the distance of the solar facility from the Las Vegas, North Las Vegas, the Moapa River Indian Reservation, Baker, Amargosa Valley, Furnace Creek, Tecopa, Goodsprings, Indian Springs, Sandy Valley, the Las Vegas Paiute Tribe, and Blue Diamond CDP, no ecological, health, or cultural impacts are anticipated, as described for construction. The census tracts within 6 miles of the Project area with minority populations and the Pahrump CDP would be adversely affected if Project operations result in the displacement of the minority populations.

Operational impacts to wildlife, recreation and visual resources, cultural resources, land use and realty, and public health and safety would be the same as the effects from construction.

- **Air Quality**: Worker vehicles traveling to and from the Project site to conduct operation and maintenance activities would emit pollutants and fugitive dust emissions. However, emissions would be significantly less than construction activities due to the reduced number of operational workers and site stabilization requirements in PEIS PDFs AQC1-3 that requires on-site roads and parking lots to be paved or treated. The site Restoration-Revegetation & Decommissioning Reclamation Plan would include restoration and revegetation requirements. Once vegetation is re-established, fugitive dust emission would be similar to existing conditions. Adverse effects to environmental justice communities would not occur.
- **Traffic:** The Proposed Action would be staffed by up to 10 full-time employees during Project operations. The Project operation and maintenance would generate 98% less vehicle trips than construction. The negligible number of vehicle trips generated during Project operations would not disproportionately affect environmental justice communities.
- **Water Resources**: During operation and maintenance activities, water would be required for solar array cleaning. Operational water requirements would be up to 16 acre-feet per year. The amount of water required for operation and maintenance activities would be significantly reduced compared to Project construction water requirements. PDF WR1-3 requires the consideration of water conservation measures to reduce Project water requirements. Environmental justice communities would not be disproportionately impacted by operational water needs because the limited use per year is not anticipated to reduce other uses by environmental justice communities.

Decommissioning Impacts

The workforce and length of time for decommissioning is expected to be similar to that of the construction but for one-third of the timeframe. Decommissioning activities would cause disproportionate ecological, cultural, human health, economic, or social impacts to minority, Native American, or low-income populations that would be the same as construction activities. Following decommissioning, the Project site would be restored to pre-construction conditions and impacts to air quality, wildlife, recreation, and land use and realty would not be adverse.

- **Air Quality**: Decommissioning activities would be similar to construction activities but shorter in duration. Effects on air quality from fugitive dust emissions could adversely affect environmental justice communities. Following decommissioning, restoration of the Project site to pre-construction conditions and impacts would not be adverse.
- **Traffic**: As discussed in Section 3.13 Transportation and Traffic, impacts to transportation and traffic during decommissioning would be similar to Project construction but for a shorter duration. Implementation of the Traffic and Transportation Plan, Signage and

Flagging Plan, and Site Access Plan required as part of the BLM ROW grant would minimize traffic and transportation impacts on environmental justice communities.

- **Wildlife**: Section 3.4 Biological Resources determined that decommissioning and site rehabilitation would result in short-term adverse effects on wildlife and habitats. Following decommissioning and site rehabilitation, wildlife habitat would be restored, and environmental justice communities would regain access to food resources. Project decommissioning would not have a substantial adverse effect on environmental justice communities.
- **Recreation and Visual Resources**: Recreation impacts to environmental justice communities from decommissioning would not occur since lands that were previously restricted during Project operations would become publicly available.
- **Water Resources**: Impacts to water quantity and quality for decommissioning activities would be similar to those associated with Project construction although would likely use one-third the amount of water. Therefore, water resource impacts from Project decommissioning would disproportionately affect environmental justice communities.
- **Cultural Resources**: Project decommissioning would remove the solar array and associated facilities and the site would be restored to pre-Project conditions. Visual, atmospheric, or audible impacts during decommissioning would be temporary. Decommissioning would restore the landscape to pre-Project conditions. Disproportionate effects to environmental justice communities would not occur.
- **Land Use and Realty**: Decommissioning activities for the Proposed Action would be similar to those associated with construction. Decommissioning would be implemented in accordance with Project reclamation plans. Following decommissioning, lands associated with the Proposed Action would remain under BLM management and would not result in impacts to surrounding land uses and realty. Project decommissioning would not have a substantial adverse effect on environmental justice communities.
- **Public Health and Safety**: Project decommissioning would have similar solid waste, hazardous materials, emergency response, and fire risks to construction activities. Therefore, disproportionate effects to environmental justice communities would occur.

Cumulative Impacts

Twenty-four cumulative projects would be constructed within the boundary of the Project environmental justice analysis area, including several adjacent solar projects. Although the environmental justice communities are located within a 55-mile extent, the cumulative projects are focused within the Pahrump Valley because this is where there is the greatest potential for cumulative effects to the environmental justice communities. Cumulative solar projects would have the potential to develop 31,465 acres of the Pahrump Valley and temporary construction impacts and environmental effects of the cumulative solar projects would be similar to those from the Proposed Action. A cumulative substantial, adverse effect to a minority, low-income, and/or Native American population would occur. Due to the distance of Las Vegas, North Las Vegas, the Moapa River Indian Reservation, Baker, Amargosa Valley, Furnace Creek, Tecopa, Goodsprings, Indian Springs, Sandy Valley, the Las Vegas Paiute Tribe, and Blue Diamond CDP, these minority communities are unlikely to be impacted by the cumulative solar projects. However, the 24 census tracts with minority, low-income, and/or Native American populations that are in proximity to the Project area would be adversely affected. Census tracts within 6 miles of the Project area, within the Pahrump CDP, and along the SR 160 corridor between Pahrump CDP and Las Vegas would bear a disproportionate share of the direct impacts of the cumulative projects due to their proximity to a large number of solar projects. It should also be noted that while the energy generated by the cumulative projects would tie into nearby substations, it would be delivered to populations outside of these areas, so the benefits would be shared outside these communities. Cumulative projects subject to the Solar PEIS would consider and implement PDF EJ1-1 as appropriate. The Solar PEIS PDF EJ1-1 includes developing and implementing focused public information campaigns to provide technical and environmental health information directly to low-income and minority groups and establishing vocational training programs for the local low-income and minority workforce to promote development of skills for the solar energy industry, among others. Mitigation measure EJ-1 would be recommended with the goal of increasing local hiring which could potentially provide a benefit to the local EJ communities.

- **Air Quality**: Cumulative projects constructed simultaneously with the Proposed Action could result in cumulative impacts to air quality. Although the cumulative projects would not result in emissions above the criteria thresholds, the cumulative projects would have an adverse effect on local air quality due to construction equipment exhaust and fugitive dust emissions. Cumulative air quality impacts would have a disproportionate effect on environmental justice communities.
- **Recreation and Visual Resources**: The planned cumulative projects would result in the loss of more than 31,465 acres of dispersed recreational land in addition to those of the Proposed Action and a loss of 67 miles of OHV trails. While there are many acreages of federal land that provide recreational opportunities throughout Nye and Clark County, environmental justice communities may not have the means to travel farther distances to access recreational areas and OHV trails. Cumulative recreational impacts would have a disproportionate effect on environmental justice communities.
- **Wildlife**: The cumulative projects would also result in 31,465 acres of wildlife habitat loss that would combine with the loss of habitat from the Proposed Action and result in cumulatively adverse impact on nearby food and resource availability for environmental justice communities. Cumulative projects subject to the Solar PEIS would be required to implement PDFs ER1-1, ER2-1, ER3-1, and ER4-1 to protect wildlife and habitat. However, long-term adverse impacts on wildlife and habitat would occur. Cumulative wildlife impacts would have a disproportionate and adverse impact on environmental justice communities.
- **Traffic**: The Copper Rays Solar Project and Golden Currant Solar Project construction periods would overlap with construction of the Project and would result in 3% and 11% increases in traffic, respectively. The short-term cumulative increase in traffic would have an adverse effect on environmental justice communities. However, each cumulative project would require a Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan that would minimize effects to roadway operations, traffic hazards, and emergency services. For these reasons, cumulative effects to environmental justice communities from traffic would not be adverse.
- **Water Resources**: The cumulative solar projects, if constructed, would require water for dust suppression and module clearing. Similar to the Proposed Action, the cumulative solar projects would likely source water from Pahrump Valley Hydrographic Basin 162. A cumulative adverse effect to the regional aquifer system would likely occur. Environmental justice communities would be impacted by the reduction of groundwater supplies from cumulative water withdrawals if the increased withdrawal of groundwater affects nearby wells. Impacts from cumulative water withdrawals would have a disproportionate and adverse effect on environmental justice communities.
- **Cultural Resources**: Construction effects on historic properties from the Proposed Action are not anticipated so it would not contribute to cumulative effects to cultural resources.

- **Land Use and Realty**: Cumulative effects on lands and realty could occur from the build-out of the Pahrump Valley and surrounding areas. The build-out of the Pahrump Valley would result in a substantial loss to other potential land uses over the life of the projects. Environmental justice communities would no longer be able to use nearby lands for other land uses. However, cumulative adverse land use and realty effects would not occur.
- **Native American Concerns**: Cumulative effects would result in the potential loss 31,465 acres of native habitat and habitat for the Mojave desert tortoise which were identified as important to consulting tribes. Additionally, effects to cultural resources from the development of 31,465 acres of the Pahrump Valley and visual change from the cumulative projects to the nearby Springs Mountain would also result in adverse cumulative effects to resources identified as having importance to Native American tribes.
- **Public Health and Safety**: Several cumulative projects would use SR 160 as an evacuation route that could result in a cumulative effect if the construction periods overlap. Emergency evacuation for environmental justice communities may be more difficult due to the increase in traffic from the cumulative solar projects. As discussed above, cumulative projects would generate fugitive dust emissions that would have an adverse effect on local air quality. Fugitive dust emissions from cumulative projects could result in an increase in exposure to Valley Fever that would adversely affect environmental justice communities. The cumulative projects would likely require similar fire prevention plans or adherence to the Solar PEIS PDFs, reducing the cumulative risk of fire. However, cumulative adverse public health and safety effects to environmental justice communities would occur.

3.8.6 Alternative 1 – Resources Integration Alternative

Under Alternative 1, grading for the Project would be limited to 20 to 21 percent, with the remaining area of development constructed using drive and crush and overland travel methods. Operation, decommissioning methods, scheduling, and personnel would remain the same as the Proposed Action. The affected area for Alternative 1 would remain the same as the Proposed Action. The effects to recreation, visual resources, wildlife, traffic, cultural resources, land use and realty, Native American concerns, and public health and safety would be similar to those for the Proposed Action although there would be less habitat loss compared with the Proposed Action. Groundwater use would be reduced to 720 AF. Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in Nevada incorporate similar techniques to reduce effects to habitat in the Pahrump Valley. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. The cumulative impacts of the Resources Integration Alternative would result in retention of approximately 8,600 acres of perennial habitat, as it would be built using overland travel which requires recovery of perennial habitat. This would reduce the cumulative effects to environmental justice communities, but would not eliminate adverse cumulative effects.

3.8.7 No Action Alternative

The Project would not be constructed under the No Action Alternative. No environmental justice impacts would occur.

3.8.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) are summarized in Appendix B. The Project would comply with the following Solar PEIS PDFs to minimize adverse impacts to environmental justice:

Solar PEIS Programmatic Design Features

- EJ1-1: Project developers shall coordinate with the BLM and other federal, state, and local agencies to identify and minimize the potential for environmental justice impacts.

Plans required as Part of the BLM ROW Grant and Mitigation Measures

- Dust Control and Air Quality Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- MM EJ-1: The proponent or its subcontractor shall hold at least one job fair for communities near the project site with the goal of hiring locally for the project workforce. The proponent or its subcontractor may also hire through local trade organizations.

3.8.9 Irreversible and Irretrievable Impacts

There are no irreversible or irretrievable impacts that would affect environmental justice populations.

3.9 Land Use and Realty

3.9.1 Introduction

This section addresses lands and realty, specially designated areas, and military and civil aviation. Regulations and laws that apply to the Project are included in Appendix C.

3.9.2 Analysis Area

The area of analysis for lands 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. Impacts resulting from Project construction, operation and maintenance, and decommissioning activities have the potential to affect (indirectly or cumulatively) lands and realty located outside the Project site.

A 5-mile radius represents a reasonable distance within which potential impacts to lands and realty may occur as land and realty impacts tend to diminish with topography and line-of-site distance. The analysis area for specially designated areas and lands with wilderness characteristics is the extent of land within approximately 25 miles of the Project site that could be directly or indirectly affected. A 25-mile analysis area of analysis was used to ascertain baseline conditions of military and civil aviation for the Project area.

3.9.3 Affected Environment

Lands and Realty

The Project site is located on BLM-administered land and surrounded by existing and proposed solar ROWs and existing and proposed electrical line ROWs. Transportation corridors, roads, and highways in the Project analysis area include SR 160, Tecopa Road, and Trout Canyon Road (refer to Section 3.15, Transportation and Traffic). An area designated under section 368(a) of the Energy Policy Act of 2005 as energy corridor 224/225 (North Pahrump/U.S. 95 to Las Vegas/Ivanpah Valley) is located immediately west of the Project site along the Clark County–Nye County border, refer to Figure 3.7-1 in Appendix D. The Project site is located directly adjacent to the existing SR 160 ROW and near an existing transmission line ROW running parallel to SR 160. The Project would be located near or adjacent to the proposed GridLiance West Core Upgrades Transmission Line Project, if approved. The Project would interconnect with the Trout Canyon Substation via a 1.5-mile gen-tie line located within the proposed ROW and entirely on BLM-managed land.

Specially Designated Areas

Areas of Critical Environmental Concern

There are three existing Areas of Critical Environmental Concern (ACEC) within 25 miles of the Project site: Stump Springs (647 acres), Kingston Range (18,873 acres), and Amargosa South (148,594 acres). Refer to Figure 3.7-2 in Appendix D for the location of the ACECs in the analysis area. The closest ACEC is Stump Springs ACEC, which is located approximately 6.5 miles south of the Project site.

National Wildlife Refuges

No National Wildlife Refuges are located within 25 miles of the Project site.

National Historic Trails

The Old Spanish National Historic Trail (OSNHT) was congressionally designated in 2002 and is jointly administered by the National Park Service (NPS) and BLM. The trail and its variants make up a 2,700-mile (4,345-kilometer) route that consists of prehistoric Native routes and historically was used commercially from 1829 to 1849 as a main trade route between Santa Fe, New Mexico, and Los Angeles, California. A 0.5-mile solar exclusion buffer was established around the designated trail route in the 2012 Solar PEIS. The management corridor for the OSNHT has not yet been designated. The BLM has established an interim corridor for the OSNHT that is five miles from the center line on either side of the trail. The Project site is located approximately 7 miles north from the closest designated trail segment of the OSNHT, as defined in the Comprehensive Administrative Strategy (BLM and NPS 2017a; BLM and NPS 2017b).

National Scenic Byways

No National Scenic Byways are located within 25 miles of the Project site.

Wilderness Areas and Wilderness Study Areas

Nine designated Wilderness Areas are within 25 miles of the Project site: Mount Charleston, La Madre Mountain, Rainbow Mountain, Pahrump Valley Wilderness, Nopah Range Wilderness, South Nopah Range Wilderness, North Mesquite Mountains Wilderness, Kingston Range Wilderness, and Resting Spring Range Wilderness (refer to Figure 3.7-2 in Appendix D). Mount Stirling is the only Wilderness Study Area within the analysis area. The closest Wilderness Area is Mount Charleston, which is located approximately 3.8 miles northeast of the Project site.

Land with Wilderness Characteristics

For an area to qualify as lands with wilderness characteristics, it must possess sufficient size, naturalness, and outstanding opportunities for either solitude or primitive and unconfined recreation. The most recent inventory for Land with Wilderness Characteristics within all BLM-managed land in southern Nevada was completed by the BLM in 2010 and 2011. The Project site does not meet the conditions for consideration as possessing wilderness characteristics.

Military and Civil 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 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.

Numerous registered airports (including airfields) are within 25 miles of the Project site (refer to Figure 3.7-3 in Appendix D). 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 42 miles east at Nellis Air Force Base (AFB).

BLM, other federal agencies, and state agencies conduct low-level flights in the region for fire operations, wild horse and burro censuses and gathers, wildlife inventories, facility maintenance, and other activities. Aerial operations for resource management activities are not known to occur in the immediate Project area nor are any aerial training activities.

3.9.4 Environmental Consequences

Methodology

Existing land use data were collected through analysis of aerial photography, field verification, review of existing studies and plans, and coordination with local and county agencies (Clark and Nye counties). The Proposed Action was reviewed for conflicts with applicable land uses and realty, plans and policies, specially designated areas, and military and civil aviation.

3.9.5 Proposed Action

Construction Impacts

Lands and Realty

The Project would not result in adverse effects to existing or proposed ROWs. The Project Applicant would be required to coordinate with existing ROW holders such as the Yellow Pine Solar Project, Nevada Department of Transportation (NDOT), or the GridLiance West Core Upgrades Transmission Project where the Project would be located adjacent to, or overlap with, an existing ROW. Any work within an existing ROW, such as within the existing NDOT SR 160 ROW, would be coordinated with the existing ROW holder. The proposed auxiliary power/telecommunications line would cross the existing SR 160 ROW and tie into the existing regardless of which route was selected. The Project Applicant would coordinate any SR 160 crossing with both NDOT and Valley Electric who would provide the energy to the substation and ultimately build and own the auxiliary power poles.

The Project proposes to interconnect with the Trout Canyon Substation at the intersection of SR 160 and Tecopa Road. The gen-tie would include an access road within the ROW for construction and maintenance. The Project's gen-tie would not create safety conflicts or incompatibilities with other transmission lines as the Project's gen-tie line does not cross other existing or proposed transmission lines. Construction of the Project's gen-tie would not conflict with other proposed gen-tie lines as the construction timeframes would not overlap because the proposed Copper Rays gen-tie line does not interconnect with the Trout Canyon Substation and would be the only gen-tie line likely to be constructed at the same time as the Project gen-tie line.

Transportation Corridors

Land use and realty impacts associated with construction activities for the Proposed Action would primarily be associated with vehicle and equipment access to the Project site. The Project site is located adjacent to an existing regional transportation corridor (SR 160), which holds an existing BLM ROW and prior use rights. Any improvements to SR 160 would require coordination with and approval by NDOT. Transportation routes in the Project area would see a 6% increase in vehicle traffic during implementation of the Proposed Action, especially during Project construction activities (see Section 3.13: Transportation and Traffic). Project construction activities would occur over an 18-month period and would not block or preclude existing land use authorizations located within or adjacent to the analysis area. Traffic concerns would be addressed within the Traffic and Transportation Plan required as part of the BLM ROW grant and would not cause an impact to adjacent landowners, land uses, or transportation routes to adjacent land. The Traffic and Transportation Plan would provide for coordination with NDOT to ensure continued access along SR 160 and Trout Canyon Road.

Intermittent temporary lane closures for SR 160 would be required for improvements to SR 160 to access the Project site. The necessary encroachment permits, concurrences, and authorizations would be obtained prior to any work within the ROWs. Vehicle traffic on SR 160 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

The Section 368 energy corridor 224/225 (North Pahrump/U.S. 95 to Las Vegas/Ivanpah Valley) is located immediately west of the Project site along the Clark County–Nye County border. The Proposed Action does not overlap with energy corridor 224/225. The Proposed Action was designed to interconnect with the existing Trout Canyon Substation and use the energy capabilities within the substation. No adverse effects on energy corridors would occur.

Specially Designated Areas

Specially designated areas identified within 25 miles of the Project site include both boundary-based features (i.e., parks and conservation areas) and linear features (i.e., national trails and byways). All specially designated areas are sufficiently separated from the Project site to avoid direct impacts or adverse land use effects.

Project components would be marginally visible from most recreation areas in the analysis area, including the OSNHT, Stump Springs ACEC, and Cathedral Canyon; however, viewers that occupy the elevated foothills along the western side of the Spring Mountains would see the moderate contrast that would result from the Project's solar field footprint within the currently undeveloped valley, along with the Yellow Pine Solar Project, which is under construction. This extends to other potential viewing areas that may occur within and in the vicinity of the Spring Mountains, such as within the Mount Charleston Wilderness Area and the Humboldt-Toiyabe National Forest. While the Project would be visible and would likely draw the attention to casual viewers, expansive views of the valley and natural vegetation would remain in all directions. Although the Project would be visible from the OSNHT, because of the distance from the Project site, existing development, and intervening topography, it is anticipated that visual contrast would be weak, and the Project would not attract the attention of casual viewers. Based on the Project's distance from the Old Spanish National Historic Trail, and the results of the visual simulation prepared from Stump Springs, the Project would not substantially interfere with or be incompatible with the nature and purposes of the Trail. Refer to Section 3.17: Visual Resources for more information on visual impacts.

Indirect land use impacts on other specially designated areas, such as the Stump Springs ACEC and Mount Charleston Wilderness Area, could occur through increased traffic and congestion on SR 160 and Tecopa Road during construction and decommissioning. Implementation of Traffic and Transportation Plan protocols would minimize adverse effects on public access to the surrounding specially designated areas during construction of the Project. Visual impacts to surrounding specially designated areas would be reduced due to the distance and would not impact the land use of these areas.

Military and Civil Aviation

Air Space

Aviation infrastructure and flight paths located within 25 miles of the site were identified by the Clark County Department of Aviation, including the Caas Airport, Shoshone Airport, Mercy Air Heliport, a parachute jump zone, and the four flight paths. The Project site is not located in proximity to any airport buffer zones, military training routes, or SUAs (refer to Figure 3.7-3 in Appendix D). The nearest airport, Caas Airport, is a small private airport located approximately 3 miles northwest of the Project site. The Project would not conflict with military or civil airspace designations or military training routes.

Tall structures, generally greater than 200 feet above grade, have the potential to create airspace obstructions. The tallest structure included under the Proposed Action would be the overhead 230 kV gen-tie structures and one microwave communications tower that would each be up to 120 feet above grade. Since the structures do not exceed 200 feet above grade, review and approval from the FAA is not required. No adverse impacts to military or civil aviation would occur. 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, other federal agencies, 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

Solar projects have the potential to introduce new sources of glare. The amount of reflectivity varies greatly among solar technologies. With anti-reflective coatings, PV panels reflect as little as 2 percent of the incoming sunlight (roughly the same as water), depending on the angle of the sun (Transportation Research Board 2011, FAA 2018). Adverse effects would be minimal or unlikely to occur and are discussed further in Section: 3.17 Visual Resources. Glare effects on aviation infrastructure and flight paths from the Project is addressed in Section 3.15: Visual Resources.

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 are installed too close to antennas (at less than 500 feet) 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. The Project would not result in residual effects to utility corridors, rangeland resources, or military and civil aviation.

Operation and Maintenance Impacts

Operational impacts to lands and realty are limited to the potential for conflict with existing land use programs, plans, policies, or authorizations. The Proposed Action would preclude the development of other uses on the Project site but does not conflict with BLM's existing solar energy project policies nor would it conflict with any existing land uses in the analysis area. The Project does include an RMP Amendment for modification of the Visual Resource Management class.

The Project is not located within any specially designated areas, and implementation of a site-specific Desert Tortoise Translocation Plan required as part of the BLM ROW grant, in accordance with the BLM's Stump Springs Desert Tortoise Translocation Plan, would be required for the Project. The Proposed Action remains in compliance with the existing and proposed land uses in the Project area.

The Project would not be located within the energy corridor 224/225 immediately to the west nor would the Proposed Action conflict with the use of the corridor. Accordingly, long-term operation of the Project would remain in conformance with the existing federal, state, or local land use plans and policies for land use and energy corridors.

Implementation of the Proposed Action would not conflict with existing BLM land use authorizations, nor would it conflict with management policies for lands with wilderness characteristics or ACECs. Operation and maintenance of the Project would therefore not conflict with any existing land use plans, policies, or authorizations. No impacts to realty or land uses would occur.

As with the construction, the Proposed Action would not result in conflicts with air space, aviation emergency, and glint and glare, nor would it interfere with communication systems. Adverse effects are not anticipated.

Decommissioning Impacts

Land use and realty impacts associated with decommissioning and reclamation activities for the Proposed Action would be similar to those associated with construction. Transportation routes in the region would see an increase in vehicle traffic during Project decommissioning activities (refer to Section 3.13). Traffic and transportation impacts from the Project decommissioning are anticipated to be approximately one-third of those during construction and would be addressed within a separate Traffic Management Plan for decommissioning. Decommissioning of the Project would occur in conformance with Project reclamation plans, which would be reviewed by the BLM and required to include any new or revised land use policies. Decommissioning activities are therefore not anticipated to result in impacts to surrounding land uses and realty.

Following facility decommissioning and reclamation activities, lands associated with the Proposed Action would be reclaimed and returned to their pre-Project state to the extent feasible. Lands associated with the Proposed Action would remain under the management of BLM and would be available for use in accordance with the BLM's multiple-use mandate. No long-term impacts to lands and realty from decommissioning activities would result.

Cumulative Impacts

The geographic scope of the cumulative effects analysis area includes the 5-mile buffer around the Project site for land uses and realty, the 25-mile buffer for specially designated areas and aviation uses. Potential cumulative effects on lands and realty could occur during Project construction, during its anticipated 30-year life span, or during end-of-life project decommissioning and removal activities.

Based on available disturbance acreages for the planned cumulative projects in the reasonably foreseeable future, the solar projects (Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Borderline Solar, Sun Baked Solar, Bonanza Peak, and Yellow Pine) would result in the use of 31,465 acres of the Pahrump

Valley and surrounding areas for solar development.[1] This is approximately 1 percent of the over 3.3 million acres managed by the Southern Nevada District Field Office. Solar development in the Pahrump Valley and surrounding areas would undergo environmental review and permitting either in Nevada or California and would require coordination with existing ROW holders and consideration of existing land uses. This would reduce any cumulative land use and realty effects.

An area designated under Section 368 of the Energy Policy Act as energy corridor 224/225 (North Pahrump/U.S. 95 to Las Vegas/Ivanpah Valley) crosses through the eastern portion of the Copper Rays Solar site and the northern portion of the Golden Currant Solar site. An RMP utility corridor also traverses both solar sites. The BLM is pursuing an RMPA to modify the existing corridors designated pursuant to Section 368 outside of the Copper Rays and Golden Currant application areas. The approval of the RMPAs would eliminate land use conflicts with the location of these corridors, and thus remove the potential for adverse impacts. As a result, long-term operation of the Copper Rays Solar and Golden Currant Solar projects would remain in accordance with the existing federal, state, or local land use plans and policies for land use and energy corridors.

Existing power lines and cumulative transmission projects (Gridliance West Core Upgrades Transmission Project #21) could cause utility conflicts during construction and during operations. The BLM requires the Applicants of the cumulative projects to coordinate with the transmission line ROW holders/applicants through the NEPA and ROW grant process to identify any potential conflicts including construction schedule and would incorporate gen-tie facility adjustments into final designs and plans, including construction activity schedules to avoid any conflicts. With the implementation of the mitigation measure, adverse effects with other existing or proposed transmission line projects would be reduced.

While a cumulative adverse effect on land use would be minimized and approximately 1 percent of the overall land managed by the Southern Nevada District Office would be affected, the build-out of the Pahrump Valley and surrounding areas would result in a substantial loss to other potential land uses over the life of the projects in this area. The cumulative build-out of the Pahrump Valley with solar development would not change the land uses for existing specially designated areas but would change the overall cumulative experience from these areas due to visual effects, as discussed in Section 3.15: Visual Resources, and change in recreational setting, as discussed in Section 3.10: Recreation.

3.9.6 Alternative 1 – Resources Integration Alternative

Construction, Operations and Maintenance, and Decommissioning Impacts

Under Alternative 1, Project construction, operations, and decommissioning activities related to effects on existing land use and realty, effects on specially designated areas, and effects on aviation would remain the same as the Proposed Action because the Project site would still be fenced and closed to other uses and developed with solar arrays; therefore, impacts to land use and realty would be the same. The infrastructure developed as part of Alternative 1 would not change compared with the Proposed Action and so would not result in taller structures that could interfere with military or civil aviation.

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[1] The exact acreage of some foreseeable future projects is not known at this time but would increase the acreages used for solar development if built.

Cumulative Impacts

The cumulative effects of the alternative combined with the build-out of the Pahrump Valley with solar development following resources integration methodologies would be the same as the cumulative analysis of the Proposed Action because the Projects would be fenced and closed to other uses. RMPAs to modify the existing energy corridors outside of the Copper Rays and Golden Currant application areas would still be required to eliminate land use conflicts. Existing power lines and cumulative transmission projects would be required to coordinate with the transmission line ROW holders/applicants through the NEPA and ROW grant process to identify any potential conflicts including construction schedule and would incorporate gen-tie facility adjustments into final designs and plans, including construction activity schedules to avoid any conflicts. With the implementation of the mitigation measure, adverse effects with other existing or proposed transmission line projects would be reduced.

3.9.7 No Action Alternative

Under the No Action Alternative, the BLM would not authorize an ROW grant, and the Proposed Action would not be implemented. The public lands in the Project area would continue to be managed by the BLM in accordance with existing land use designations, which may include the construction and operation of a different solar project or other energy development. There would be no use of the land area or designated utility corridors and, therefore, no addition to cumulative land use impacts.

3.9.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are summarized in Appendix B.

Solar PEIS Programmatic Design Features

- LR2-1: Solar facilities shall be sited, designed, and constructed to avoid, minimize, and/or mitigate impacts on BLM land use planning designations.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Traffic and Transportation Plan

3.9.9 Irreversible and Irretrievable Commitments of Resources

There would be an irretrievable loss of recreational uses because the Project site would be graded and fenced, and those uses would be precluded for the life of the Project (approximately 30 years). There would be no irreversible commitments of resources because the Project site would be reclaimed after termination of the Project and these uses could then be reestablished.

3.10 Native American Concerns

3.10.1 Introduction

This section focuses on cultural and religious concerns that are specific to Native Americans or to which Native Americans bring a distinct perspective. Regulations, policies, and laws pertaining to Native American cultural and religious concerns, include the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act (NAGPRA), Section 106 of the National Historic Preservation Act, Joint Secretarial Order 3403, Executive Order 13007, BLM Handbook 1780-1 (2016), and BLM Permanent Instruction Memorandum (PIM, 2022-011). These regulations are described in more detail in Appendix C.

3.10.2 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 roads, collector lines, and the gen-tie line. It also includes areas that are visible within a 15-mile buffer of Project where there is a higher potential for views of the development area, see Section 3.17, Visual Resources, for more information regarding the Project viewshed.

3.10.3 Affected Environment

Federally Recognized Tribes

The Project site falls within the tribal traditional use area that can be attributed to both the Southern Paiute and Western Shoshone (Kelly and Fowler 1986, Deur and Confer 2012). The federally recognized tribes that were contacted and provided an opportunity to comment or consult regarding this EIS are listed in Section 4.3, Formal Consultation with Tribal Governments. Government-to-government consultation is ongoing with the Moapa Band of Paiutes and Timbisha Shoshone as well as coordination with other Southern Paiute groups from the Chemehuevi Indian Tribe and the Twenty-Nine Palms Band of Mission Indians. All of these Tribes are consulting parties for Section 106 of the NHPA and NEPA. In addition, one non-federally recognized tribe, the Pahrump Paiute Tribe was invited to offer comments for Section 106 of the NHPA (see 36 CFR 800.8(c)(1)(i)-(v)) and NEPA.

The Southern Paiute and Western Shoshone

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). Both the Pahrump Band of Paiutes and the Las Vegas Band of Paiutes call themselves *Nipakanticimi,* which means the "people of Charleston Peak," and for these groups the Spring Mountains are a place of Creation that provide important temporal and spiritual resources (Deur and Confer 2012). Western Shoshone groups including the Timbisha also used the Spring Mountains where they hunted large and small game animals and during the summer gathered seeds, roots, and berries, and in the fall, pine nuts. Lowland areas such as the Pahrump Valley were utilized in the early spring when edible greens were available.

Overview of Culturally Important Resources. The Southern Paiute and Western Shoshone have used the Project area for thousands of years based on archaeological data and time immemorial based on indigenous ethnographic histories. The region is of great cultural significance to the Southern Paiute and Western Shoshone as they believe these lands were given to them by their Creator. The Project area contains numerous cultural features that contribute to the history and the long-term use of this region by the Southern Paiute and Western Shoshone. They 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. Based on tribal consultation, no sacred sites, traditional use areas, or Traditional Cultural Properties (TCP) have been identified in the Project area.

The Salt Song Trail is a spiritual regional landscape with physical places, which is integral to Southern Paiute cultural traditions, values, and mortuary practices. The Salt Song Trail is an intangible landscape without defined boundaries that sweeps through Nevada, California, Arizona, and Utah. The Salt Song Trail generally travels through the Pahrump Valley. Mt. Charleston is a known physical place within the trail, which is adjacent but outside of the proposed project footprint. No tribes expressed comments or concerns regarding any physical trails and locations associated with the Salt Song Trail in the Project area.

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, there are several springs to the south and west.

Geologic Features. Prominent geologic features in the Project area include the surrounding mountain ranges, including the Spring Mountains northeast which extend to the southeast, the Kingston Range to the south, and the Nopah Range to the west.

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 3.16, Vegetation, Special Status Plants, and Noxious Weeds. Based on ethnographic information, creosote bush has current Native American medicinal uses and historically willows, mesquite, and sumac were harvested in the Pahrump Valley (Stoffer, et al. 2008). Through tribal consultation, Tribes have not expressed any concerns regarding impacts to the continuation of traditional plant gathering and/or access to these resources.

Historic Properties, Sacred Sites, or Traditional Cultural Properties. Under Section 106 of the NHPA, Native American consultation and coordination has not identified any historic properties, sacred sites, or Traditional Cultural Properties (TCPs) in the Project area. However, the Project is near mountain ranges to the west and east that have tribal significance, in particular Mt. Charleston in the Spring Mountains.

3.10.4 Environmental Consequences

Methodology

Impacts on Native American concerns 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.

3.10.5 Proposed Action

Construction

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). The Moapa Band of Paiutes have expressed concerns regarding the protection of cultural and natural resources and long-term impacts of the Project and have requested cultural sensitivity training for construction crews and the involvement of the tribe in different aspects of the Project, including tribal monitoring during construction. Solar PEIS PDF NA2-1 requires the Project developer provide training to contractor personnel whose activities or responsibilities could affect issues and areas of concern to federally recognized Indian tribes. The Timbisha Shoshone and the Twenty-Nine Palms Band of Mission Indians are interested in the protection of the Mojave desert tortoise. Impacts to the Mojave desert tortoise are discussed in depth in Section 3.5, Threatened and Endangered Species which notes that the displacement of all adult tortoises on the Project site and potential loss of juveniles not detected during surveys, in addition to the loss of habitat, could result in a substantial adverse impact on the species and the local population. The Project would reduce effects to the Mojave desert tortoise through the implementation of Solar PEIS PDFs and other plans, such as the Desert Tortoise Translocation Plan, required as part of the BLM ROW grant.

The Twenty-Nine Palms Band of Mission Indians and the Chemehuevi Indian Tribe shared concerns about the long-term impact of the Project on the environment and interest in the protection of cultural resources. Section 3.7, Cultural Resources, concludes there would be no adverse effects to cultural resources due to construction of the Project.

Additionally, the Moapa Band of Paiutes has suggested Traditional Ecological Knowledge be considered in the NEPA analysis, particularly in relation to Spring Mountains and Amargosa Valley, but no additional information has been provided at this time. Traditional Ecological Knowledge is a type of Indigenous Knowledge, which is a system of knowledge defined by the White House 2022 Memorandum as “Indigenous Knowledge is a body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes and Indigenous Peoples through interaction and experience with the environment” (Prabhakar and Mallory 2022). Amargosa Valley is outside the scope of the Project, but the BLM will consider this feedback for future proposed actions in that area. Visual effects to the Spring Mountains from construction of the Project have been considered in Section 3.17, Visual Resources, particularly in the context of the operation and maintenance of the Project as described below. Although none have been shared at this time, the BLM will continue to consult with interested Tribes to provide opportunities for identifying Indigenous Knowledge that should be considered in proposed protection measures. Additionally, Mitigation Measure NA-1 would be recommended to further reduce effects on potential resources important to Tribes.

Operation and Maintenance

Effects of operation and maintenance of the Proposed Action would be similar to those from construction as the removal of vegetation and effects to wildlife would continue during operation and maintenance of the Project.

The Proposed Action could have adverse visual effects on the mountain ranges identified during consultation. As noted in Section 3.17, Visual Resources, elevated views from the western Spring Mountains would have a moderate contrast which would result in adverse visual effects from the Spring Mountains over the life of the Project (anticipated to be 30 years).

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-Revegetation & Decommissioning-Reclamation Plan required as part of the BLM ROW grant, 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. However, the Project site may not fully recover the diversity present under existing conditions, and adverse effects could continue for the decades to a century or more the site could take to recover given the level of disturbance associated with the Proposed Action.

Cumulative Impacts

The planned cumulative solar projects could result in the loss of 31,465 acres of native habitat in the Pahrump Valley. The solar projects (Mosey, Canyon Mesa, Copper Rays, Yellow Pine, Golden Currant, Larrea, Borderline Solar, Sun Baked Solar, and Bonanza Peak Solar) along with the ARES Energy Storage Project and transmission line projects considered for cumulative effects would involve ground disturbance and vegetation clearing, resulting in the loss of native vegetation communities and loss of Mojave desert tortoise habitat, both of which are considered important to Native American tribal concerns, see Section 3.4, Wildlife, Migratory Birds, and Other Special Status Wildlife; Section 3.5, Threatened and Endangered Species; and Section 3.16, Vegetation, Special Status Plants, and Noxious Weeds. The cumulative projects could result in effects to cultural resources, if any are present in the areas identified for development, see Section 3.7, Cultural resources. The development of the Pahrump Valley floor would result in a further modification of the viewshed from the Spring Mountain, see Section 3.17, Visual Resources, a cumulatively adverse effect to an area identified by the Moapa Band of Paiutes in relation to Traditional Ecological Knowledge. The overall cumulative development of the Pahrump Valley would result in an adverse cumulative effect to resources identified as having Native American importance.

3.10.6 Alternative 1 – Resources Integration Alternative

Construction, Operations and Maintenance, and Decommissioning Impacts

Impacts to historic properties from construction activities under Alternative 1 would be consistent with those described above under the Proposed Action because the location of Alternative 1 would be the same and the entire site would be fenced. Alternative 1 would leave more vegetation in place because it would entail fewer acres of grading and would have an established threshold for effects to perennial vegetation. This would allow regrowth of plants after decommissioning reducing the long-term effects to habitats important to Native American concerns.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in the Nevada portion of the Pahrump Valley incorporate similar techniques to reduce environmental effects in the Pahrump Valley. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. The cumulative impacts of the Resources Integration Alternative would result in retention of approximately 7,300 acres of perennial habitat, as it would be built using overland travel methods which requires recovery of perennial habitat, see Table 3.2-3 in Section 3.2. Use of the overland travel method of construction would reduce the cumulative effects to native habitats and Mojave desert tortoise habitat which have been identified as important to Native American concerns, see Section 3.4, Wildlife, Migratory Birds, and Other Special Status Wildlife; Section 3.5, Threatened and Endangered Species; and Section 3.16, Vegetation, Special Status Plants, and Noxious Weeds. Nonetheless, the overall loss of habitat in the Pahrump Valley would still result in an adverse cumulative effect to native habitats and the Mojave desert tortoise. Additionally, the effects to cultural resources and visual resources would remain cumulatively adverse, similar to the Proposed Action, see Section 3.7, Cultural Resources and Section 3.17, Visual Resources.

3.10.7 No Action Alternative

Under the No Action Alternative, the solar field, gen-tie line, energy storage system, and associated linear facilities would not be developed because the BLM would not issue the ROW grant. No ground disturbance would occur, and there would be no changes or alterations to the landscape. Therefore, there would be no impacts to resources important to Native Americans. Existing conditions in the analysis area would continue.

3.10.8 Project Design Features and Mitigation Measures

The Solar PEIS PDFs are provided in full in Appendix B. The Project would comply with the following Solar PEIS to minimize adverse impacts on Native American concerns:

Solar PEIS Programmatic Design Features

- Prior to construction, the project developer shall provide training to contractor personnel whose activities or responsibilities could affect issues and areas of concern to federally recognized Indian tribes.

Mitigation Measures

- MM NA-1: To facilitate continued communication and coordination with interested tribes, the Applicant/Proponent would develop and implement a tribal participation program to afford representatives designated by Indian tribes the opportunity to be on site during project construction to observe grading, trenching, or other excavation for facilities, roads, or other project components related to the undertaking near ESAs and in other areas determined appropriate.

3.10.9 Irreversible and Irretrievable Impacts

Irreversible or irretrievable impacts are those that cannot be reversed or recovered. Implementation of the Proposed Action would result in irreversible or irretrievable impacts on up to 1,767 acres of native vegetation across the development area which has been noted to be of importance to Native American tribes during consultation.

3.11 Public Health and Safety

3.11.1 Introduction

This section describes the regulations and baseline information related to public health and safety, including occupational health and safety, hazardous wastes and materials, emergency response, intentional destructive acts, electric and magnetic fields (EMFs), and fire risks. Several laws and regulations apply to the Project and are described in Appendix C to the RMPA/EIS.

3.11.2 Analysis Area

The analysis area for public health and safety considerations is the Project site and alternatives as well as the proposed gen-tie line because that is where existing public health and safety issues may overlap with the Project if current or historic hazardous materials are located on the Project site. The analysis area for the hazardous waste and materials analysis is limited to areas within 1 mile 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 Project site and SR 160 because SR 160 serves as a local and regional emergency route. Appendix C lists the relevant public and health and safety regulations.

3.11.3 Affected Environment

Occupational Health and Safety

Occupational hazards associated with solar energy projects tend to be similar to those associated with heavy construction and electric power industries. These hazards 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 EMFs 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 EMFs have generated evidence that is inconclusive. EMFs also decrease substantially with increasing distance from source. For example, a magnetic field measuring 57.5 milligauss immediately beside a 230 kilovolt transmission line measures 7.1 milligauss at a distance of 100 feet and 1.8 milligauss at a distance of 200 feet, according to the World Health Organization in 2010 (National Institute of Environmental Health Sciences 2022).

Solid Waste

Collection and disposal of solid waste in Clark County is managed by the Southern Nevada Health District (SNHD) Solid Waste Management Authority (SWMA). The Apex Landfill, a Class I landfill, is the main landfill in Clark County. The nearest landfill is the Nye County Landfill, a Class I landfill located in Nye County.

Emergency Response

Regional access to the Project site is provided from the primary access at the intersection of SR 160 and Trout Canyon Road. Project-related roads providing direct access to the site include the Project access way and solar field access ways. SR 160 serves as the regional evacuation route and would be the primary evacuation route for the Project employees in the event of an emergency.

Public Health

Clark County's mortality rate due to respiratory and heart disease is a higher than the United States average, cancer mortality rates are similar (SNHD 2017). *Coccidioides* is a fungus that resides in soils in some areas of the Southwestern United States. Coccidioides spores can circulate in the air after contaminated soil is disturbed. Inhalation of the spores can cause a pulmonary disease known as Coccidioidomycosis, also commonly referred to as valley fever. The occurrences of valley fever in Clark County are also low. There were 139 cases of valley fever in Clark County in 2021, up from 134 in 2020 (SNHD 2022).

Fire Risks

The Project site is within an area of low and low-to-moderate wildfire threat[1] as determined by the Nevada Division of Forestry (Nevada Department of Forestry 2022). There are no recorded wildfire occurrences within the Project site. The most recent fire in the Project vicinity was east of the Project site, in the Spring Mountains, in 2013 (Nevada Division of Forestry 2022). In addition, the Sandy Valley Fire in 2021 was located approximately 15 miles southeast of the project site near Sandy Valley Road and SR 160.

Hazardous Materials

A review of aerial imagery and the Nevada Division of Environmental Protection Site Cleanup Database did not identify potential sources for hazardous materials in the analysis area (Nevada Division of Environmental Protection 2023). The site is currently undeveloped and does not support structures. Primary access to the existing site is provided by SR 160, which is the same access route that would be used for the Proposed Action. No specific health and safety issues have been identified for the existing site. Based on a review of aerial photographs in Google Earth (1994-2019), there is no evidence of recognized environmental conditions in connection with the Project area.

3.11.4 Environmental Consequences

Methodology

Existing public health and safety issues were identified as part of the analysis and compared with the Project’s anticipated construction, operation, maintenance, and decommissioning impacts to determine whether effects to public health and safety would occur.

[1] 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.

3.11.5 Proposed Action

Construction Impacts

Occupational Health and Safety

Occupational hazards during construction of the Project, such as heat stress or stroke, exposure to hazardous materials, electric shock, and accidents or injuries, would be minimized with implementation of safety standards and the use of appropriate personal protective equipment as required by Occupational Safety and Health Administration (OSHA) and Nevada OSHA law. Employees would be trained on monitoring, proper notification, and containment following a hazardous material release as detailed in the Spill Prevention, Control, and Countermeasure (SPCC) Plan, as required by law. However, as adverse effects to workers could still occur, preparation of a Hazardous Materials and Waste Management Plan would be required as part of the BLM ROW grant.

Solar PEIS Project Design Feature (PDF) Hazardous Materials and Waste (HMW) 1-1 requires the preparation and implementation of a Hazardous Materials and Waste Management Plan that outlines the training of personnel on all appropriate OSHA and Nevada OSHA guidelines. Adverse effects from construction-related occupational hazards would be minimized through the implementation of the PDFs.

Risk of Hazardous Materials Accidents or Spills

Construction of the Project would involve the use, storage, and disposal of hazardous materials. An on-site aboveground fuel storage tank may be used to refill construction vehicles, equipment, and generators. 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. Solar PEIS PDF HMW 1-1, requiring creation of a Hazardous Materials and Waste Management Plan, would address the characterization, on-site storage, and disposal of all resulting wastes. The plan would include Safety Data Sheets (SDSs) for each type of hazardous material on site and a site map of the fueling and storage areas for hazardous materials. The plan would establish procedures for fuel storage and refueling that reduce the potential for impacts from leaks, such as siting refueling areas on paved surfaces away from surface water locations and drainages. A Stormwater Pollution Prevention Plan (SWPPP) would also be prepared, which would establish procedures to minimize the effect of accidental releases on water quality.

Implementation of Solar PEIS PDF HMW 1-1 and compliance with regulations would minimize the risk of hazards associated with accidents and spills during construction. 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 in the area, and the flat topography.

Solid Waste Management

Construction of the Project would generate solid waste such as construction waste, plastics, cardboard, and wood. All handling and processing of construction debris, including hazardous and non-hazardous materials, would be in accordance with applicable regulatory requirements. Solar PEIS PDF HMW 1-1 requires identifying and minimizing the waste stream during construction of the Project and establishing regular removal of waste. The solid waste generated during construction would not exceed the capacity of local landfills, including the nearby Nye County Landfill. Any specialty wastes, such as solar panels or battery storage, would be taken to specialty locations for recycling or disposal, see SNDO-required PDF Gen-2. There would be no adverse effects related to solid waste management.

Emergency Response

Access to the site is provided by SR 160 (a designated major evacuation route). Encroachment permits and authorizations would be obtained prior to any work within the SR 160 ROW. With proper coordination and implementation of the requirements of the encroachment permits, there would be no adverse effects to emergency response.

In the event of an emergency, an estimated up to 555 construction workers may need to evacuate. Implementation of Solar PEIS PDF HMW 1-1 requires preparation of an Emergency Response Plan. The Emergency Response Plan would also comply with OSHA (29 CFR 1910.38[a]) and Nevada OSHA guidelines. The Emergency Response Plan would identify the evacuation routes for construction workers and Project personnel during an emergency, communication protocols, and notifications. With implementation of Solar PEIS PDF HMW 1-1, construction of the Proposed Action would not result in any adverse effects to emergency response activities.

Intentional Destructive Acts

Site security would include fencing and possibly motion sensor lighting, on-site security guards, cameras, and other technology during construction and operation. Perimeter security fencing would be 7 feet in height (inclusive of 6 feet of fencing, with 1 foot of barbed wire at the top). The entire site would be fenced appropriately to restrict public access during construction and operation. Chain-link security fencing would be installed around the site perimeter, substation, and other areas requiring controlled access. Implementation of security fencing would reduce the risk of exposure to individuals during construction-related activities.

Electric and Magnetic Fields

No residences or other uses would be subject to EMF exposure from the proposed gen-tie line due to the distance between the gen-tie line and the nearest residence, which is over 1 mile away. Adverse effects to humans from EMF exposure are not anticipated.

Fire Risks

The probability of a wildfire resulting from Project construction would be low due to the low and low-to-moderate wildfire threat rating in the Project area (Nevada Department of Forestry 2022). The occurrence of wildfires in most 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 to 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. Project construction could increase the fire hazard risk through the introduction of ignition sources to an undeveloped area.

A thermal runaway is an incident where one exothermal process triggers other processes, finally resulting in an uncontrollable increase in temperature. Utility-scale battery storage has an inherent risk of thermal runaway events due to the chemical composition of the batteries. These events can generate combustible gases which may rapidly combust (deflagrate) if not managed properly and therefore can pose a risk to human safety if appropriate fire mitigation techniques are not implemented.

The battery storage system would be designed and installed according to the latest National Fire Protection Association (NFPA) 855 standards. NFPA 855 is the industry standard fire code and employs a practical large-scale fire test called UL9540A to demonstrate the efficacy of fire detection, suppression, and deflagration management. Based on these standards, vegetation around and under the battery storage system would be cleared to prevent fire propagation in the areas among containers. The proposed battery storage would comply with the NFPA 855-2023 and the more stringent local code to mitigate risks of fires or rapid combustion in battery storage units.

Fire mitigation systems vary by manufacturer, but to comply with NFPA 855, the system must include a NFPA 72 compliant central station fire alarming system and deflagration management system that complies with NFPA 68/69. NFPA 855 also limits fire suppression to methods specified in NFPA 12, 15, 750, 2001, and 2019. These methods include the use of dry agents, water mist, high pressure water and a passive fire containment method. The use of dry agents provides rapid fire suppression, but may not address thermal runaway events, as they can be ineffective in extinguishing fires fueled by the high heat and chemical reactions involved in battery thermal events. Water-based interventions can extinguish fires, but risk creating toxic runoff and require significant volumes of water. A code-compliant passive fire containment method primarily uses field-tested spacing between units, which allows the fire to burn while venting gases and preventing fire propagation, leaving only ash for easier cleanup, and reduced environmental impacts. Compliance with NFPA 855 would limit potential impacts associated with thermal runaway.

Solar PEIS PDF Wildland Fire (WF) 1-1 requires the implementation of fire management measures that identify and minimize fire risk, such as providing worker training to all Project personnel prior to their entering the Project work site. Solar PEIS PDF WF 1-1 also requires inspection and monitoring measures to reduce fire risk during construction, operation, maintenance, and decommissioning of a solar energy development. The Project would implement Solar PEIS PDF WF 2-1, which further reduces on-site fire risks by requiring passive and active vegetation management to minimize the potential to increase the frequency of wildland fires and prevent the establishment of non-native, invasive species on the solar energy facility and its transmission line and roads. The Project would implement SNDO-required PDF FIRE-1, which requires the project provide detailed GIS shapefiles for all components. While Solar PEIS PDFs WF 1-1 and 2-1 and SNDO-required PDF FIRE-1 would reduce the fire risk from the Project, they do not require a comprehensive plan to review and address all fire risks during construction. MM PS-1 is recommended and requires preparation and implementation of a Fire Prevention and Safety Plan to minimize adverse effects associated with increased fire hazards during construction. With implementation of Solar PEIS PDFs 1-1 and 2-1 and MM PS-1, the Proposed Action would not result in adverse effects from an increase in the risk of wildfire.

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 Proposed Action would not increase risks or bring West Nile virus and Zika to the area because the Proposed Action does not include open water storage or ponds where mosquitos could breed. 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. The Project would implement Solar PEIS PDFs AQC1-1 and AQC1-2 as well as mitigation measure (MM) Air-1 to further reduce potential air quality impacts during construction (see Section 3.3, Air Quality). Specifically, Solar PEIS PDF AQC1-2 requires projects to identify measures to minimize air quality impacts, such as preparing a Dust Abatement Plan (included in the Dust Control and Air Quality Plan). Effects from valley fever would not be adverse.

Operation and Maintenance Impacts

Occupational Health and Safety

Occupational hazards during operation and maintenance are similar to those identified for construction; however, fewer workers would be involved in operations and maintenance than with construction. Implementation of Solar PEIS PDFs HMW 1-1, HMW 2-1, and HMW 3-1, an SPCC plan, and compliance with OSHA and Nevada OSHA regulations would minimize potential occupational hazards during operation and maintenance activities.

Risk of Hazardous Materials Accidents or Spills

Operation and maintenance 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. 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. Limited use of herbicides or pesticides would occur to control non-native and noxious weeds. If herbicides or pesticides are required, they would be limited to those analyzed and approved by BLM in the 2007 Vegetation Treatments Using Herbicide on BLM Lands in the 17 Western States PEIS and the 2016 Final Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States PEIS. Solar PEIS PDFs ER1-1, ER2-1 and ER3-1 would be implemented to address the spread of weeds associated with construction activities. Invasive plant species and noxious weeds within the Project site would be managed with manual treatments whenever possible, such as hand-pulling, which can be effective in areas with small, isolated populations. Herbicides approved by the BLM and meeting Solar PEIS ER3-1 requirements would be used as necessary. Effective treatment of invasive species populations would comply with BLM and state of Nevada laws and regulations and are outlined in the Integrated Weed Management Plan in the Plan of Development that would be implemented during construction and operation of the Project to address management and control of invasive species. Refer to Section 3.16 Vegetation, Special Status Plants, and Noxious Weeds for more information on herbicides and pesticide uses.

The process for treatments would be characterized in a Pesticide Use Proposal approved by the BLM. 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.

Solar PEIS PDFs HMW 1-1, 2-1, and 3-1, including the Hazardous Materials and Waste Management Plan, 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. Solar PEIS PDF HMW 3-1 would require maintaining compliance with the terms and conditions for hazardous materials and waste management during operations and maintenance by mitigations measures such as installing sensors or other devices to monitor system integrity and implementing robust site inspection and repair procedures. Implementation of mitigation measures would minimize adverse effects associated with hazardous materials upset.

Although solar panels for utility-scale facilities would most likely use nonhazardous silicon-based semiconductor material, it is possible that some solar panels may use semiconductors containing heavy metals, such as cadmium, selenium, and arsenic. These metals are fully contained within the solar panels and would not be released under normal operating conditions (BLM and DOE 2010). The Project includes battery storage on site to help store the energy produced by the panels so the energy can be released at optimal times. The type of battery is not yet determined, but lead-acid batteries, commonly used for vehicle, equipment, and backup power source batteries, typically contain battery electrolyte, which is a fluid material that can be hazardous and prone to accidental release (BLM and DOE 2010). Lithium-ion-based batteries include industry-standard design features to greatly reduce the potential of a spill or leak.

Solid Waste Management

The Proposed Action would produce wastes typically associated with operation and maintenance activities for a solar project. 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 operations and maintenance would not exceed the capacity of the local landfills, and there would be no adverse effects. Solar panels and 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, HMW 1-1 requires preparation and implementation of a Hazardous Materials and Waste Management Plan prior to operation to minimize potential effects.

Emergency Response

Operation and maintenance of the Project 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. Operation and maintenance activities would not result in any adverse impacts to emergency response activities during operation. Risk to on-site workers would be minimized with implementation of an Emergency Response Plan, in accordance with OSHA and Solar PEIS PDF HMW 1-1. Effects to workers from an emergency during operation and maintenance would not be substantial.

Intentional Destructive Acts

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 during the operation and maintenance phase. Non-emergency access would be limited to the access gates from SR 160. Adverse impacts associated with intentional destructive acts during operations and maintenance of the Proposed Action are unlikely given the security measures included in the design and the relatively low likelihood of such an action.

Electric and Magnetic Fields

No residences or other uses would be subject to EMF exposure from the operation of the proposed gen-tie line due to the distance between the Project gen-tie and residences, which is over 1 mile. Adverse effects to humans from EMF exposure are not anticipated.

Fire Risks

The probability of a wildfire occurring due to operation and maintenance activities would be low due to the low- and low-to-moderate-risk site conditions and the required training of operations staff. Solar PEIS PDF WF 1-1 would require the Project to incorporate fire management trainings into the worker trainings for all phases of the Project's life including operations. The worker training would ensure the workers are aware of key fire mitigation efforts of the Project work site during all phases of the Project's life. Compliance with regulations and implementation of PDFs would reduce but not eliminate fire hazard risks from hazardous materials, improper disposal of batteries, and line breakages. Solar PEIS MM PS-1 is recommended and requires preparation and implementation of a comprehensive Fire Prevention and Safety Plan to minimize adverse effects associated with increased fire hazards during operations, including requiring a battery-specific fire suppression plan. Implementation of Solar PEIS PDFs WF 1-1 and WF 2-1 and of HMW 1-1 and MM PS-1 would reduce adverse effects associated with fire hazards during operation and maintenance.

Decommissioning Impacts

Occupational Health and Safety

Risks to public health and safety from decommissioning activities would be similar to those associated with construction. The site-specific Site Restoration-Revegetation & Decommissioning-Reclamation Plan would be required to include measures to reduce potential impacts to the public and occupational workers from Project activities to the extent feasible in accordance with federal and state laws (refer to Appendix C).

Hazards associated with recycling and waste processing of the solar panels and batteries during decommissioning would use permitted facilities for these activities and follow all applicable federal, state, and local laws and regulations. A site-specific Site Restoration-Revegetation & Decommissioning-Reclamation Plan required as part of the BLM ROW grant would be prepared in coordination with the BLM that would address future land use plans, removal of hazardous materials, impacts and mitigation associated with closure activities, schedule of closure activities, equipment to remain on the site, and conformance with applicable regulatory requirements and resource plans.

Decommissioning activities would be similar to construction activities and would also require implementation of Solar PEIS PDFs HMW 1-1, HMW 2-1, HMW 3-1, HMW 4-1, and HMW 5-1 and compliance with OSHA and Nevada OSHA guidelines. Solar PEIS PDFs HMW 4-1 and HMW 5-1 would require emergency response capabilities during reclamation and decommissioning, and decommissioning design features, implementation of the Hazardous Materials and Waste Management Plan, health and safety training, and the SPCC Plan would minimize potential adverse health and safety impacts to Project personnel.

Risk of Hazardous Materials Accidents or Spills

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 site, such as refrigerants, spent solar panels, and electrical equipment. Inadvertent release of hazardous materials could occur. Compliance with existing laws and regulations and Solar PEIS PDFs HMW 1-1, HMW 2-1, HMW 3-1, HMW 4-1, and HMW 5-1 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

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. Specialty waste, such as solar panels or battery storage systems, would be recycled or taken to specialty waste facilities and would not contribute to the nearby landfill waste unless specifically allowed at that time (in 30 years). No adverse effect would occur.

Emergency Response

Decommissioning activities would be similar to construction activities and would not impair implementation of or physically interfere with an adopted Emergency Response Plan. Solar PEIS PDF HMW 4-1 requires Project developers to maintain emergency response capabilities throughout the reclamation and decommissioning period for as long as hazardous materials and wastes remain on site.

Intentional Destructive Acts

The risk to workers or to the public from intentional destructive acts during decommissioning would be minimal. Decommissioning includes the removal of the facility. Once the facility is taken offline, the likelihood of its being a target of intentional destructive acts is even further reduced, with minimal consequences, as the Project would no longer operate and produce power.

Electric and Magnetic Fields

No residences or other uses would be subject to EMF exposure from the proposed gen-tie line during decommissioning as the line would be taken out of service. Adverse effects to humans from EMF exposure are not anticipated.

Fire Risks

Potential effects from decommissioning would be similar to those described for construction.

Cumulative Impacts

Cumulative projects would involve the use, storage, and disposal of hazardous materials. SR 160 is also used to access many of the cumulative projects and would be used to transport any potentially hazardous materials used in construction, operation and maintenance, and decommissioning of the cumulative projects. 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 Proposed Action would contribute to a potentially substantial adverse cumulative effect. Preparation of a Hazardous Materials and Waste Management Plan in accordance with Solar PEIS PDF HMW 1-1 would minimize the Proposed Action's contribution to a potentially substantial effect on occupational health and safety and risk of hazardous materials accidents or spills. Cumulative projects would be required to comply with existing health and safety laws and Solar PEIS PDFs or other BLM BMPs, which would reduce the adverse cumulative effects.

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. Additionally, each cumulative project is anticipated to be required to recycle materials where feasible and follow the Solar PEIS or BLM BMPs to reduce the cumulative waste.

Several cumulative projects would use SR 160 to access the solar sites during construction, operations, maintenance, and decommissioning. SR 160 serves as a regional evacuation route, and the use of it by several solar projects during construction could result in a cumulative effect if the construction periods overlap. Rough Hat Clark construction is most likely to overlap with the construction of Copper Rays, Golden Currant, and Yellow Pine Solar. The total cumulative analysis area of the five projects (including Rough Hat Clark) is approximately 12,000 acres.

Implementation of Solar PEIS PDF HMW 1-1 requires preparation of an emergency response plan and would be required for both the Rough Hat Clark County and Golden Currant solar projects. Similar BMPs would be expected for Copper Rays, thereby reducing the cumulative effects to emergency responders. No adverse cumulative effect is anticipated.

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 wildfire ignition. 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. Solar PEIS MM PS-1, which requires preparation and implementation of a Fire Prevention and Safety Plan, along with implementation of Solar PEIS PDFs WF 1-1 and WF 2-1, would further reduce the risks of wildland fires. The cumulative projects would likely require similar fire prevention plans or adherence to the Solar PEIS PDFs, reducing the cumulative risk of fire.

3.11.6 Alternative 1 – Resources Integration Alternative

Under Alternative 1, Project construction, operation, and decommissioning activities related to the use of hazardous materials, solid waste, emergency response, intentional destructive acts, EMFs, and fire risk would remain the same as the Proposed Action; therefore, impacts to public health and safety would be the same.

3.11.7 No Action Alternative

Under the No Action Alternative, the Project would not be developed, and there would be no hazards or risks introduced to the public. Therefore, there would be no impacts to public health and safety in the analysis area.

3.11.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are summarized in Appendix B. The Project would comply with the following Solar PEIS PDFs and mitigation measures to minimize adverse impacts to wildlife:

Solar PEIS Programmatic Design Features

- HMW 1-1: Project developers shall coordinate with the BLM and other federal, state, and local agencies early in the planning process to assess hazardous material and waste concerns and to minimize potential impacts, including a Developing a Hazardous Materials and Waste Management Plan
- HMW 2-1: Solar facilities shall be characterized, sited and designed, and constructed to minimize hazardous materials and waste management design elements.
- HMW 3-1: Compliance with the terms and conditions for hazardous materials and waste management shall be monitored by the project developer. Consultation with the BLM shall be maintained through the operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- HMW 4-1: Project developers shall maintain emergency response capabilities throughout the reclamation and decommissioning period as long as hazardous materials and wastes remain on site.
- HMW 4-2: All design features developed for the construction phase shall be applied to similar activities during the reclamation and decommissioning phases.
- WF 1-1: Project developers shall coordinate with the BLM and other appropriate fire organizations early in the project planning process to determine fire risk and methods to minimize fire risk.
- WF 2-1: Solar facilities shall be sited and designed to minimize fire risk.

- ER 1-1: Project developers shall consult with the BLM and other federal, state, and local agencies in the early phases of project planning to help ensure compliance with Federal regulations that address the protection of fish, wildlife, and plant resources, with appropriate Federal, state, and local agencies.
- ER3-1: The developer shall manage vegetation utilizing the principles of integrated pest management, including biological controls to prevent the spread of invasive species, per the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, and the National Invasive Species Management Plan, 2009* and the *Final Programmatic Environmental Impact Statement for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States, 2016*. Consultation with the BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- ER3-2: The developer shall, in consultation with the BLM and appropriate federal, state, and local agencies, manage projects so as to minimize impacts on ecological resources during operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.

Southern Nevada District Office Project Design Features

- GEN-2: Lithium batteries, and all other batteries, would be properly recycled during operations and decommissioning.
- Fire-1: Prior to Notice to Proceed (NTP), for human health and safety reasons, and to meet the conditions of the Fire Management Plan, the ROW holder will need to submit detailed shapefiles of the site plan to include the exact location of BESS, roads, (all the other things you requested). If there are changes to any of these site details, they will be submitted to BLM in an updated site plan with updated geospatial data within 48 hours.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Spill Prevention, Control, and Countermeasure (SPCC) Plan
- Health and Safety Plan (including a Fire Management Plan, Emergency Response Plan, Hazardous Materials and Waste Management Plan, and Trash Abatement Plan)
- Stormwater Pollution Prevention Plan (SWPPP)
- Emergency Response Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- MM PS-1: Fire Prevention and Safety Plan. The Applicant shall prepare and implement a Fire Prevention and Safety Plan to ensure the safety of workers and the public during Project construction, operation and maintenance, and decommissioning activities. The Fire Prevention and Safety Plan shall be submitted to the BLM for review and approval prior to the issuance of the NTP. The plan shall incorporate the use of appropriate fire protection equipment, worker training, and consultation with local fire departments to identify appropriate protocols and procedures for fire prevention and early response to minor fires. The plan shall also address the following recommendations, with particular focus on suppressants for fires from lithium-ion battery cells, including inert gas, carbon dioxide, and Halon as well as measures to protect batteries against thermal abuse:
    - Have a portable trailer-mounted water tank on site and available to workers at all times for use in extinguishing small human-caused fires.
    - Implement fire watches during hot work on site (e.g., welding, soldering, cutting, drilling, grinding).
    - Incorporate the use of appropriate fire protection equipment, worker training, and consultation with local fire departments to identify appropriate protocols and procedures for fire prevention and early response to minor fires.

- Limit where smoking can occur to minimize chances of igniting a fire and identify proper vehicle maintenance and use to minimize fire risks.
- Require a separate, battery-specific fire suppression plan that identifies any specialized fire suppression techniques for the particular battery used and any specific trainings required for the Project staff and first responders.
- Ensure protocols are in place to quickly extinguish any transmission line breakages that could ignite a fire during construction.
- Comply with fire restrictions, such as red flag warnings, when they are in effect (43 CFR 9212). Fire restrictions are generally enacted from May through October. Fire restriction orders are available for review at the BLM district offices and on the BLM website.
- Practice standard fire prevention measures at all times.
- Provide access between shared or adjacent fences to allow quicker response times, where applicable.
- Immediately report fires to 911 or (702) 631-2350 and make all accommodations to allow immediate safe entry for firefighting apparatus and personnel.
- BLM law enforcement or their designated representative shall conduct an Origin and Cause Investigation on any human-caused fire. To minimize disturbance of potential evidence located at the fire scene, the Applicant shall properly handle and preserve evidence in coordination with the BLM. The BLM shall pursue cost recovery for all costs and damages incurred from human-caused fires on BLM lands when the responsible party(s) has been identified and evidence of legal liability or intent exists. Legal liability includes, but is not limited to, negligence and strict liability (including statutory and contractual liability) and products liability.

3.11.9 Irreversible or Irretrievable Impacts

An irreversible or irretrievable impact would occur if the public or workers were exposed to hazardous waste and materials, occupational accidents, EMFs, or wildland fires. Construction, operation, maintenance, and decommissioning activities would occur in accordance with all applicable laws and regulations governing health and safety. Implementation of these standard practices would reduce potential occupational health and safety risks. Although the Project would use hazardous materials during construction, operation, maintenance, and decommissioning, it is unlikely that the accidental release of hazardous materials would result in irreversible or irretrievable impact due to the types and quantities of the hazardous materials used. If an accidental release were to occur, exposure to hazardous materials would be minimized by the implementation of the PDFs and the various health and safety plans. There are no reasonably foreseeable future actions that would cumulatively increase the risk of public or occupational exposure to hazardous materials in the analysis area.

3.12 Recreation

3.12.1 Introduction

This section addresses potential Project-related changes that alter or otherwise physically affect established, designated, dispersed, or planned recreation areas, resources, experiences, activities, or outcomes. Public lands in the Pahrump Valley and wider region of Nevada offer unique and diverse settings and opportunities for recreation. Key recreation areas include the Spring Mountains National Recreation Area and the Old Spanish National Historic Trail (OSNHT) (shown in Figure 3.12-1 in Appendix D). Regulations and laws that apply to the Project are provided in Appendix C. Impacts to public access are evaluated in accordance with Secretarial Order 3373: Evaluating Public Access and BLM Public Land Disposals and Exchanges.

3.12.2 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. Project impacts resulting from construction, operation, maintenance, and decommissioning activities have the potential to affect recreational resources both in the Project area and, to some degree, outside the Project area due to indirect impacts such as noise and dust. This analysis identifies recreational resources throughout the geographic area where direct and indirect impacts are anticipated to occur and in the timeframe in which Project effects would occur.

Additionally, the analysis area (totaling 572,934 acres) considers a 15-mile buffer around the Project, which corresponds to the visual impact analysis area (refer to Section 3.15). The buffer associated with visual impacts is considered an appropriate geographic extent for potential recreation impacts because recreational users within this area could potentially be visually affected by the Project, and the recreational experience within the viewshed could change as a result of the Project. The analysis area is shown in Figure 3.12-2.

3.12.3 Affected Environment

This section describes the recreational setting in terms of recreational opportunities in the analysis area, including designated recreation sites, recreation access points, designated trails, and dispersed and non-designated recreation activities. The analysis area is located primarily within the Southern Nevada Extensive Recreation Management Area (ERMA), where recreational opportunities are administered by the BLM under the Las Vegas RMP (BLM 1998). The analysis area includes public lands that can be used for recreation, such as BLM-designated Stump Springs Area of Critical Environmental Concern (ACEC) and Spring Mountains National Recreation Area. Recreational access throughout the analysis area consists primarily of SR 160, Trout Canyon Road, unpaved Old Route 16, existing trails, and dry washes. No formal route designation process has been completed on BLM lands in or around the analysis area, however the current route designation is limited to existing trails and dry washes.

1998 Las Vegas Resource Management Plan, Southern Nevada ERMA

The 1998 Las Vegas RMP encompasses approximately 3.1 million acres of public land administered by the BLM Southern Nevada District in Clark and Nye counties. Recreation management areas, objectives, and actions in the Project area are identified in the 1998 Las Vegas RMP (BLM 1998). The analysis area is located primarily within the 2,243,358-acre Southern Nevada ERMA, which includes most public lands managed by BLM in southern Nevada east and west of Las Vegas (except Red Rock Canyon National Conservation Area). The Southern Nevada ERMA is managed by the BLM for dispersed and diverse recreation opportunities that meet Recreation Opportunity Spectrum (ROS) objectives described in the Las Vegas RMP. Recreation opportunities in the ERMA generally include hiking, camping, hunting, horseback riding, cycling, driving for pleasure, OHV use, and photography (BLM 1998).

Three main categories of recreation are found on BLM-administered lands: dispersed recreation, developed recreation, and special recreation permitting. Dispersed recreation and commercial Special Recreation permits are found in the Project area. There are no designated access points or recreation sites within the Project area. Actual recreational uses within the Project site have not been documented although scoping comments highlighted nearby dispersed camping. Access to the area for recreational purposes is limited to existing trails and dry washes. There is currently one active, and two proposed special recreation permits within the analysis area.

Specially Designated Areas

Areas of Critical Environmental Concern

ACECs are areas within existing public lands that require special management to protect important and relevant values. ACEC designations highlight areas where special management attention is needed to protect important historical, cultural, scenic, wildlife or other natural resources. The types of activities allowed within an ACEC depend on the resource and natural value the area is designated to protect (Bureau of Land Management 2022). The Stump Springs ACEC (647 acres) is located approximately 6.5 miles south of the Project site. The Stump Springs ACEC is used as a recreational facility for users of the OSNHT. The Stump Springs ACEC relevant and important values identified in the Las Vegas RMP (1998) are the prehistoric camp and historic trail/camp.

National Wildlife Refuges

No national wildlife refuges are located within the 15-mile analysis area. The nearest national wildlife refuge is the Ash Meadows National Wildlife Refuge, within the Desert National Wildlife Refuge Complex, which is located approximately 27 miles northwest of the Project site.

National Historic Trails

The OSNHT was congressionally designated in 2002 and is jointly administered by the NPS and BLM. The trail and its variants make up a 2,700-mile route that consists of prehistoric Native routes and was used commercially from 1829 to 1849 as a main trade route between Santa Fe, New Mexico, and Los Angeles, California. A 0.5-mile solar exclusion buffer has been established around the designated trail route in the 2012 Solar PEIS. The Project site is located approximately 7 miles north from the closest designated trail segment of the OSNHT, as defined in the Comprehensive Administrative Strategy (BLM and NPS 2017a; BLM and NPS 2017b).

National Scenic Byways

No national scenic byway is located within 15 miles of the Project site.

Wilderness Areas and Wilderness Study Areas

Five designated wilderness areas are within 15 miles of the Project site: Mount Charleston, La Madre Mountain, Rainbow Mountain, Pahrump Valley Wilderness, and Nopah Range Wilderness (shown in Figure 3.12-1). Mount Stirling is the only wilderness study area within the analysis area. The closest wilderness area is Mount Charleston, which is located approximately 3.8 miles northeast of the Project site.

Recreational Uses

The following uses occur in the Project vicinity: OHV, equestrian, hiking, camping, hunting, and target shooting. OHV use is the most common recreational activity in the Project area. OHV travel in the Project area occurs on existing roads, trails, and dry washes. Approximately 2.5 miles of limited to existing trails is used for OHV travel crosses the site (shown in Figure 3.12-3 in Appendix D). Additional miles of dry washes cross the site and are used for recreation. Table 3.12-1 provides the number and distance of trails within the 15-mile buffer and within the Project site.

Table 3.12-1 Recreational Trails in the Project Vicinity

Location	Number of trails	Total distance of trails (miles)
Within 15-mile buffer	62	583.2
On site	1	2.5

Source: (BLM, 2018)

There is one active Special Recreation Permit, and the BLM has received two additional applications for the establishment of commercial guided special recreation permits, such as guided OHV tours, within the Project vicinity and analysis area. Most of the local OHV events occur to the north of Pahrump, where OHV activities are more popular due to the proximity of other public lands, such as the Big Dune Recreation Area located approximately 50 miles north of the Project. Recreational OHV use in the Project vicinity tends to be from residents of Pahrump or the surrounding areas, and commercial permits.

The development of the solar facility would result in the closure of 2.5 miles of a currently accessible OHV trail (shown in Figure 3.12-2) and additionally would close off dry washes used for recreation. However, the BLM has not established designated recreational staging or access points in the Project vicinity. OHV users may access the trail near the Project from SR 160, Trout Canyon Road, Tecopa Road, or Old Route 16.

The Copper Rays Project *OHV Counts Quarter 4 2022 Report* (TRC 2023) provides results of OHV counts that were collected on the adjacent site for the proposed Copper Rays Solar Project, see Table 3.12-2. The data was collected from November 2022 to October 2023 along trails at locations requested by BLM, and data is still being collected for the routes. Four counters were buried under the middle of the on-site trails. The counters did not measure direction of travel, so traffic counts represent vehicles traveling in either direction on the trails. Counter 4 is located on the same trail that crosses the Project site, so data from Counter 4 on the Copper Rays Solar trail segment would be the same as for the Rough Hat Clark Solar trail segment. Table 3.12-2 provides the OHV counts by month and the average daily trip (ADT), which is the number of trips per recorded days.

Table 3.12-2 OHV Counter Data by Month

Counter #[1]	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023	Sept 2023	Oct 2023	Monthly Average
1	26	18	13	30	35	28	17	11	6	24	23	9	20
2	101	77	83	81	168	150	104	135	81	N/A[2]	N/A	N/A	109
4	9	1	7	8	4	8	13	4	0	0	3	0[3]	4.75

Notes:

1. Counter 3 is not located on a trail that crosses the Rough Hat Clark Solar site. The trails with Counters 1 and 2 do not cross the Project site but they lead to the trail with Counter 4 so were included for informational purposes and to provide a more complete understanding of the use of trails in the Pahrump Valley.
2. In July, data was collected from Counter 2 through July 6, and remaining data was lost due to a rainstorm.
3. In October, data was collected from Counters 1, 3, and 4 through October 10.

Source: (TRC 2023)

Equestrian

Equestrian activities, also known as horse riding or horseback riding, may occur in the Project vicinity. The BLM does not have designated routes for equestrian activities, but the use is allowed throughout the Project analysis area. The BLM does not have data on the number of equestrian users in the area, but it is assumed to be low due to the lack of sites of interest in the immediate vicinity.

Hiking

Hiking may occur along the unpaved trails commonly used by OHV users. The BLM does not have data on the number of users in the area, but it is assumed to be low due to the lack of sites of interest in the immediate vicinity. Hikers most likely frequent the nearby features such as Mount Charleston to the east, Nopah Range Wilderness Area to the southwest, or the mountain ranges to the northwest of Pahrump, some of which would have views of the Project.

Camping

Dispersed camping is currently permitted within the Project analysis area and surrounding areas. The BLM does not have data on the number of campers in the area but is aware that dispersed camping dose occur in the immediate vicinity. Camping in the area predominately occurs at the Spring Mountain Recreation Area and Red Rock National Conservation Area.

Hunting and Target Shooting

The Project is in Game Management Unit (GMU) 262, managed by the Nevada Department of Wildlife (NDOW). Big-game hunting in GMU 262 is primarily focused on elk and desert bighorn sheep (Nevada Department of Wildlife 2022). Detailed data on the taking of small game are not readily available for GMU 262; however, upland birds and small-game species such as mourning dove (*Zenaida macroura*) and white-winged dove (*Zenaida asiatica*), Gambel's quail (*Callipepla gambelii*), chukar (*Alectoris chukar*), American crow (*Corvus brachyrhynchos*), rabbit (*Sylvilagus audubonii*), jackrabbit (*Lepus californicus*), and general varmint can legally be taken in the analysis area. The practice of falconry is allowed for game animals in GMU 262 as is trapping of fur-bearing animals (Nevada Department of Wildlife 2022).

No designated shooting areas occur on the Project, but undesignated target shooting may occur on or within the Project vicinity. A private shooting range, Front Sight Firearms Training Institute, is located approximately 6 miles southwest from the Project site.

3.12.4 Environmental Consequences

Methodology

The area of analysis for recreation is the extent of land that could be directly (physical change) or indirectly (visual change) affected by the Project and where access to recreational opportunities could be directly or indirectly affected. The analysis area includes facilities, roads, gen-tie lines, and collector lines. Determination of potential impacts to recreation from the Proposed Action and alternatives is primarily based on existing recreation resource management data provided by the BLM Southern Nevada District Office (SNDO). Spatial/geographic information system (GIS) information and recent aerial images were also used in this analysis to identify potential non-designated recreational opportunities and uses. Impacts to recreation have been quantified where possible and, if not quantifiable, have been qualitatively discussed.

3.12.5 Proposed Action

Construction Impacts

Recreation-related construction impacts would include disturbing and excluding recreational uses on the entire 2,469-acre Project site. Security fencing would be erected that would prohibit public access to the full 2,469-acre site.

There is one identified unpaved recreation trail that crosses the Project site (shown in Figure 3.10-2). As noted in Table 3.12-2, the use of this trail is low (averaging 6 trips per month at counter 4). The Project's individual contribution to loss of trails would involve loss of 2.5 miles of a trail, 0.4 percent of the 583 miles of trail in the analysis area. Closure of the trail would not substantially affect the OHV community and would not be considered an adverse effect. The most active and used trails were the trails located to the southwest of the Project site and west of the proposed Copper Rays Solar Project site near Old Route 16. Additional dry washes cross the site and are used for recreation. Due to the low volume of users compared with the surrounding trails, it is assumed that the trail is not a popular connector trail to the OHV trail network. Construction of the Project would have limited effect on OHV use in the Project vicinity.

Construction of some Project features (e.g., solar arrays, power poles, microwave communications tower, substations, and the distribution line crossing SR 160) could be visible to dispersed recreational users for distances of up to 15 miles. Potential impacts to visual resources are discussed in detail in Section 3.15: Visual Resources. Views of construction of the Project would change the recreational experience from the current views of the open Pahrump Valley and would appear more industrial and developed. Portions of the Pahrump Valley, such as the existing Yellow Pine project and the town of Pahrump, are currently built, and the construction of the Project would continue this trend. Construction noise might be audible to recreational users during the 12-to-18-month construction period. However, construction noise would not result in significant impacts to recreation users as construction noise would be temporary, short-term, and dispersed across a large (approximately 2,469 acre) site that would diminish noise impacts.

During construction, the Proposed Action would temporarily increase traffic in the analysis area by 6 percent[1]. The increase in traffic would be most noticeable in the Project vicinity along SR 160, where construction traffic would be entering and exiting SR 160. Local traffic accessing recreational sites in the Project area may experience intermittent delays due to construction traffic on SR 160 during the construction period. Construction would generally occur between 7 a.m. and 7 p.m., Monday through Friday. Traffic and transportation impacts are addressed in detail in Section 3.16: Transportation. The increase in vehicle traffic during construction and decommissioning is not expected to create unacceptable delays on SR 160 and would occur on weekdays when there is typically less dispersed recreation. Implementation of a Traffic and Transportation Plan protocols required as part of the BLM ROW grant would reduce any potential traffic impacts during construction of the Project.

Operation and Maintenance Impacts

The development of the solar facility would result in the closure of one currently accessible OHV trail, as described under Construction Impacts, above. The closure would remain in place for the duration of the ROW, approximately 30 years, and would reduce the total available accessible routes in the Pahrump Valley, an adverse effect. As noted under Construction Impacts, the route is not used with frequency during the peak OHV season and would not substantially affect the OHV community.

Approximately 2,469 acres of land that is currently open to dispersed recreational use would be removed from use for a period of approximately 30 years during the estimated life of the Project. Furthermore, restoration of the site 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. The Southern Nevada ERMA is approximately 2,518,035 acres in size, which means that the Project (2,469 acres) represents less than 0.1 percent of the ERMA.

Some Project features (e.g., solar arrays, power poles, microwave communications tower, substations, and the distribution line crossing SR 160) could be visible to dispersed recreational users for distances of up to 15 miles. This includes recreational users of the Wilderness and Wilderness Study Areas within 15 miles. 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. The presence of Project features would also contribute to a diminished opportunity for solitude for recreation users in those areas with views of the Project features. Visual resource impacts are addressed in detail in Section 3.15: Visual Resources. PDFs VR2-1 and VR2-3 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.

Operational activities are not expected to affect recreation access or opportunities on the Stump Springs ACEC and OSNHT because of their distances from the Proposed Action and the relatively minor increase

[1] The analysis area for transportation and traffic is a 5-mile radius around the Project area and focuses on the primary public-access transportation routes that would be used by the Project. These include State Route (SR) 160, Trout Canyon Road, and Tecopa Road (see Figure 2-1). Hafen Ranch Road, Indian Reservation Road, Manse Road, Caas Road, and E. Gamebird Road are also within the 5-mile radius around the Project site; however, these roads are not anticipated to be used as transportation routes for the Project.

in operations-related traffic. Based on the Project's distance from the OSNHT, and the results of the visual simulation prepared from Stump Springs, the Project would not substantially interfere with or be incompatible with the nature and purposes of the Trail. Refer to Section 3.17: Visual Resources for more information on visual impacts.

Decommissioning Impacts

The effects of Project decommissioning on recreation access and opportunity would roughly mirror those discussed for construction. Impacts from decommissioning on recreation would differ from construction in that lands previously restricted (for the 30-year Project lease period) would once again become publicly accessible. Decommissioning typically requires one-third of the workforce, time, and resources as construction of the Project. Decommissioning would occur between 4 to 6 months. Project decommissioning would occur following the Project-specific Site Restoration and Revegetation Plan and Site Decommissioning Plan required as part of the BLM ROW grant. The plans would outline decommissioning activities, safety and protection measures, reclamation procedures, and success criteria as well as notification and abandonment scheduling. The plans would also include requirements for long-term monitoring and maintenance as needed to ensure that restoration goals are attainable and completed. Visual, noise, and traffic impacts for Project decommissioning experienced by recreational users are anticipated to closely mirror those discussed above for construction.

Cumulative Impacts

The analysis area for cumulative recreation impacts includes the 15-mile buffer around the Project site (572,934 acres). As noted in Table 3.12-1, there are approximately 583 miles of recreation trails within the 15-mile buffer. The effects on recreation from past and present projects in the analysis area include the construction of the Yellow Pine Solar Project. Reasonably foreseeable future actions that could incrementally contribute to potential recreation impacts include the Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea solar projects on BLM lands in Nevada and the Borderline, Sun Baked, and Bonanza Peak solar projects in California.

Based on available disturbance acreages for the planned cumulative solar projects, the solar projects (Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Borderline Solar, Sun Baked Solar, Bonanza Peak, and Yellow Pine) would result in the loss of 31,465 acres of dispersed recreational land. While the loss of dispersed recreation in the Pahrump Valley would be adverse, areas near the Project would be available for recreational use including the Humboldt-Toiyabe National Forest, Mount Stirling Wilderness Study Area, Mt. Charleston Wilderness, La Madre Mountain Wilderness and Nopah Range Wilderness Area (shown in Figure 3.12-1).

Cumulative solar projects would result in closure of 67 miles of OHV trails during the life and decommissioning of the Project.[2] This would represent a loss of approximately 11.5 percent of the routes in a 15-mile buffer area. Additionally, numerous dry washes that are used for OHV recreation would also be no longer available. Due to the large number of acreage potential effected by the six projects proposed for development, and one currently active project, in the Pahrump Valley and the overall reduction in trail network, there would be a cumulatively adverse effect on OHV recreation.

[2] The exact acreage of some foreseeable future projects is not known at this time but would increase the acreages used for solar development if built.

Adding Rough Hat Clark Solar Project, along with all reasonably foreseeable future actions such as but not limited to, Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea solar projects on BLM lands in Nevada and the Borderline, Sun Baked, and Bonanza Peak solar projects in California would result in a contribution to cumulative impacts to recreation resources and opportunities in the Pahrump Valley and surrounding BLM managed lands, by displacement of the casual user, potential overcrowding of the surrounding areas such as Big Dune, and possible interfering with existing special recreation permits in the area. Displacing dispersed motorized recreation to surrounding lands could also contribute to increased motorized use and cross-country motorized travel within Wilderness and Wilderness Study Areas where that use is prohibited. This would result in increased management challenges to BLM and the USFS to prevent those motorized incursions from occurring.

Also, recreationalists that use nearby recreation areas would cumulatively experience a change in views and recreation experience due to the cumulative build out of the Pahrump Valley, which would be considered substantial and adverse (see Section 3.15: Visual Resources).

3.12.6 Alternative 1 – Resources Integration Alternative

Construction, Operation and Maintenance, and Decommissioning Impacts

Under Alternative 1, Project construction, operation, and decommissioning activities related to the loss of recreational use at the Project site, loss of 2.5 miles of recreational trails, change in recreational experience due to change of views of the Pahrump Valley, and effects to public access would remain the same as the Proposed Action because the Project site would still be fenced and closed to recreationalists and developed with solar arrays; therefore, impacts to recreation would be the same.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in the Nevada portion of the Pahrump Valley would incorporate similar construction techniques as the Alternative to reduce effects to habitat in the Pahrump Valley. The cumulative analysis does not assume similar construction techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. Cumulative effects to recreation would be the same as with the Proposed Action because the fencing for the cumulative solar projects would remain the same and would reduce recreational use of the Pahrump Valley.

3.12.7 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, operated, maintained, or decommissioned; therefore, existing recreational uses would continue in the Project site and adjacent public lands. The landscape and existing non-designated roads and trails would not be altered, and there would be no changes to the scenery, traffic, or levels of noise. Therefore, the existing recreation activities, settings, and experiences would remain the same (no change from current conditions).

3.12.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) are summarized in Appendix B. The Project would comply with the following Solar PEIS PDFs to minimize adverse impacts to recreation:

Solar PEIS Programmatic Design Features

- PDF VR 2-1: Solar facilities shall be sited and designed to minimize glint and glare.
- PDF VR2-3: The siting and design of solar facilities, structures, roads, and other project elements shall explore and document design considerations for reducing visual dominance in the viewshed.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Traffic and Transportation Plan
- Site Restoration and Revegetation Plan and Site Decommissioning Plan

3.12.9 Irreversible or Irretrievable Impacts

Irreversible or irretrievable impacts are those that cannot be fully reversed or recovered. The analysis considers irreversible impacts as those that permanently affect future recreational uses, e.g., not addressable through Project restoration or reclamation. Irretrievable impacts are those lost recreation opportunities that occur during the lifespan of the Project that would be reinstated only after Project reclamation is complete. The Proposed Action and its alternatives are anticipated to share the following irreversible or irretrievable impacts: public access restrictions on the Project site during the life of the Project, Project components visible to recreational users, and landscape scarring after Project decommissioning.

The Project would convert up to approximately 2,469 acres of public land available for recreation into land inaccessible by the public and used for renewable energy purposes. By excluding public access to the Project site, recreational access and opportunities in the Project area would be irretrievably lost with no provision for public access during the Project duration. Additionally, the Project would irretrievably alter dispersed recreation use patterns because public access would be denied to and through the Project site. The Project would disrupt the visual setting during the operational life of the Project, which would result in a change in view for recreational users.

The Project site would be reclaimed after the lifespan of the Project (30 years), which could reinstate public access and allow dispersed recreation opportunities to return. However, it could take years before the reclaimed site is open to recreational uses. The reclaimed Project footprint could visibly persist for years beyond reclamation, which could constitute an irreversible impact to the recreational setting.

3.13 Socioeconomics

3.13.1 Introduction

This section analyzes the impacts of the Proposed Action and alternatives on the socioeconomic issues identified during scoping, which include Project-related economic expenditures and job creation, population and housing impacts, effects on tourism and recreation economies, and effects to property values. The analysis relies on the technical report *Economic and Fiscal Impact Assessment for the Rough Hat Clark Solar Project* (Triple Point Strategic Consulting 2022).

3.13.2 Analysis Area

Workers needed for the Project would be living in (or would move to) surrounding communities within Clark County and Nye County, primarily the city of Las Vegas and the town of Pahrump. Therefore, the analysis area for the socioeconomic analysis encompasses both Clark County and Nye County, Nevada.[1]

3.13.3 Affected Environment

Demographics

Population

The Project area is located on the border of Clark County and Nye County, Nevada. The town of Pahrump is the closest population center to the Project area and is located approximately 15 miles northeast of the Project area in Nye County. The town of Pahrump has a population of approximately 42,471 people, which accounts for approximately 85 percent of the total population of Nye County (U.S. Census Bureau 2020). The nearest metropolitan center to the Project area is the city of Las Vegas, approximately 50 miles east. The Las Vegas metropolitan area has an estimated population of 2.2 million people and includes the cities of Las Vegas, North Las Vegas, and Henderson, and the unincorporated towns of Summerlin South, Paradise, Spring Valley, Sunrise Manor, Enterprise, Winchester, and Whitney (Texas A&M Univesrity 2023). The city of Las Vegas is the largest city in Clark County, with a population of approximately 634,786 people, accounting for 28.4 percent of the county's population. As shown in Table 3.13-1, Las Vegas and Clark County had a population of increase of 9.5 percent and 17.7 percent, respectively, from 2010 to 2021. The town of Pahrump and Nye County had an increase of 17.7 percent and 14.1 percent, respectively, during the same time frame.

[1] The EIS considered including Inyo County, CA as part of the analysis area; however, as the nearest population center in Inyo County is Charleston View which had approximately 0 persons in the most recent census, the analysis area did not include Charleston View or Inyo County (U.S. Census Bureau 2023). However, as there may be people living in Charleston View or unincorporated areas of Inyo County, it should be noted that the effects to these areas would be similar to the effects to the more rural areas of Pahrump.

Table 3.13-1 Analysis Area Population (2010 to 2021)

Analysis area	Population 2010	Population 2021	Percent change 2010 to 2020
Pahrump Census Designated Place (CDP)	36,091	42,471	+17.7
Nye County	43,878	50,096	+14.1
Las Vegas City	579,786	634,786	+9.5
Clark County	1,895,521	2,231,147	+17.7
Nevada	2,633,331	3,059,238	+16.1

Source: (U.S. Census Bureau 2021)

Employment and Income

The Project site is in Clark County on the border of Nye County, near Pahrump Census Designated Place (CDP). CDPs[2] are a statistical geography that represents closely settled, unincorporated communities, which are locally recognized and identified by name, for the purpose of providing meaningful statistics for well-known, unincorporated communities. As of 2020, Clark County accounted for approximately 75 percent of the population of the state of Nevada. Unemployment rates have decreased for the analysis area since 2010. In the analysis area, the city of Las Vegas had the lowest unemployment rate, at 6.9 percent in 2020 and Pahrump CDP had the highest unemployment rate, at 9.8 percent (U.S. Census Bureau 2020; U.S. Census Bureau 2010). The unemployed populations in 2020 within Clark County and Nye County were 78,453 persons and 1,442 persons, respectively. In 2020, a total of 72,716 workers were employed in the construction sector in Clark County, and 1,269 were employed in the construction sector in Nye County (United States Census Bureau 2020). Per capita income in the analysis area is the lowest in Pahrump CDP and the highest in Clark County. Nye County has a per capita annual income that is $5,000 less than that of Clark County. As shown in Table 3.13-2, Las Vegas and Clark County had a household income increase of 20.1 percent and 21.0 percent, respectively. The town of Pahrump and Nye County had an increase in household income of 22.9 percent and 19.1 percent, respectively. Table 3.13-3 summarizes the top industries in Clark County by total economic output. Table 3.13-4 summarizes the top industries in Nye County by total sales.

Table 3.13-2 Household Income (2010 to 2021)

Analysis Area	2010 Mean income (dollars)	2021 Mean income (dollars)	Percent change 2010 to 2021
Pahrump Census Designated Place (CDP)	54,770	67,350	22.9
Nye County	55,027	65,554	19.1
Las Vegas City	71,637	86,008	20.1
Clark County	72,600	87,879	21.0
Nevada	72,112	89,562	24.2

Source: (U.S. Census Bureau 2023)

[2] From the U.S. Census Bureau "Census Designated Places" webpage, accessed 2023.

Table 3.13-3 Top 15 Clark County Industries by Total Economic Output, 2020 (dollars)

Industry description	Total output
Owner-occupied dwellings	$11,049
Other real estate	$10,935
Hotels and motels, including casino hotels	$7,678
Management of companies and enterprises	$5,777
Hospitals	$4,567
Tenant-occupied housing	$4,126
Limited-service restaurants	$4,031
Local government and education	$3,653
Non-depository credit intermediation	$3,578
Insurance carriers, except direct life	$3,428
Insurance agencies, brokerages	$3,308
Full-service restaurants	$3,186
Monetary authorities	$3,150
Local government other services	$3,148
Retail – non-store retailers	$3,059

Source: (Triple Point Strategic Consulting 2022)

Table 3.13-4 Top 15 Nye County Industries by Total Sales, 2021 (million dollars)

Industry description	Total output
Mining (except Oil and Gas)	$794
Professional, Scientific, and Technical Services	$406
Local Government	$257
Utilities	$179
Administrative and Support Services	$167
State Government	$164
Federal Government	$106
Specialty Trade Contractors	$84
Real Estate	$80
Ambulatory Health Care Services	$65
Amusement, Gambling, and Recreation Industries	$63
Accommodation	$62
Food Services and Drinking Places	$61
Animal Production and Aquaculture	$56

Industry description	Total output
General Merchandise Stores	$42

Source: (University of Nevada 2022)

Housing

Housing units and vacancy rates in the analysis area are presented in Table 3.13-5. The city of Las Vegas and Clark County have higher occupancy rates than Pahrump CDP and Nye County. The city of Las Vegas has the highest occupancy rate, at approximately 93.8 percent. Vacancy rates for Pahrump CDP and Nye County are higher than those of the city of Las Vegas and Clark County. Pahrump CDP and Nye County have vacancy rates of 13.9 percent and 15.8 percent, respectively.

Table 3.13-5 Housing and Occupancy Analysis

Analysis area housing occupancy	Pahrump CDP	Nye County	Las Vegas city	Clark County	Nevada
Total units	21,488	25,191	256,713	917,656	1,281,018
Percent occupied	87.8	86.4	93.8	92.2	91.9
Percent vacant	13.9	15.8	6.6	8.5	8.8

Source: (Unite States Census Bureau 2020, Decennial Census 2020 Housing Units)

Access to Local Emergency Services

Police. The Las Vegas Metropolitan Police Department (METRO) is a consolidation of the Clark County Sheriff's Department and the City of Las Vegas Police Department (Clark County 2021). The METRO services Las Vegas and all unincorporated areas of Clark County. The METRO headquarters is located in the city of Las Vegas. The nearest police station is the Nye County Sheriff's Office, Southern Area Command, approximately 13 miles northwest of the Project site in the town of Pahrump.

Fire Protection. The BLM is responsible for responding to wildfires on BLM-managed public land. However, the BLM is not responsible for responding to fires that are not considered wildfires. Fires not considered wildfires (e.g., structural fires, hazardous materials fires) would be responded to by the local jurisdiction. The proposed Project would fall within the jurisdiction of the Clark County Rural Fire Department (CCFD). The nearest CCFD station is located 11 miles northeast of the Project site on Trout Canyon Road (Clark County 2022). In Nye County, the closest emergency responder would be Pahrump Valley Fire & Rescue. The nearest Pahrump Valley Fire & Rescue station is Station 3, located 5.6 miles west of the Project site, at the intersection of Squaw Valley Road and Kellogg Road.

Hospitals. The nearest hospital to the Project site is the Desert View Hospital in the town of Pahrump. The Desert View Hospital is approximately 13 miles northwest of the Project site. The Desert View Hospital provides 24-hour emergency care for residents and visitors in Nye County. Hospitals are also available in the city of Las Vegas. The nearest hospital in the city of Las Vegas is the Southern Hills Hospital and Medical Center approximately 29 miles east of the Project site.

Tourism and Recreation

Tourism is an integral part of Nevada's economy. In 2021, tourism generated an economic impact of approximately 62.5 billion dollars and employed over 350,000 workers (Tourism Economics 2022). A majority of Nevada's tourism and recreation industry is concentrated in the Las Vegas metropolitan area. The direct economic output from the Las Vegas metropolitan area and southern Nevada is approximately 44.9 billion dollars (Applied Analysis 2023). Hotels and casinos represent over 12 percent of the regional employment in southern Nevada, including the city of Las Vegas (Applied Analysis 2023). The entire tourism and recreation industry in Las Vegas and southern Nevada employs 21.9 percent of the regional workforce (Applied Analysis 2023). Tourism and recreation in Nye County primarily consist of gambling, restaurants, and outdoor recreation including OHV and ATV off-road activities. Tourism and recreation industries in Nye County generate approximately 63 million in annual sales (University of Nevada 2022).

Social

The Project site is in the Pahrump Valley adjacent to the southern tip of Nye County. The Project site is located southeast of the town of Pahrump. The Southern Paiute occupied the valley prior to European settlement (McCracken 1990). White men began settling the Pahrump Valley in the early 1870's (McCracken 1990). The primary industry during the late 19th century and early 20th century was agriculture and mining. Since the 1970's, the Pahrump Valley has experienced rapid growth. The population of the town of Pahrump has increased from 2,000 residents in 1980 to 38,000 residents in 2020. The primary industries in the Pahrump Valley and Nye County are shown in Table 3.13-4.

Social Cost of Carbon

The social cost of carbon is the cost of the damages created by one extra ton of carbon dioxide emissions. The social cost of carbon calculator estimates the monetized damages associated with incremental increases in greenhouse gas (GHG) emissions in a given year. The Council on Environmental Quality (CEQ) issued the *Interim NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (86 FR 1196 (Jan. 9, 2023)). While CEQ works on updated guidance, it has instructed agencies to consider and use all tools and resources available to them in assessing GHG emissions and climate change effects including recommending that agencies provide additional context for GHG emissions through social cost of GHG estimates.

The social cost of carbon considers how GHG emissions affect global temperatures, sea level rise, and other biophysical processes; how these changes affect society through, for example, agricultural, health, or other effects; and monetary estimates of the market and nonmarket values of these effects.

3.13.4 Environmental Consequences

This section describes the potential impacts to socioeconomic factors associated with the construction, operation and maintenance, and decommissioning of the Project.

Methodology

Economic Impact Analysis for Planning (IMPLAN) modeling was used to estimate the economic impact of constructing, operating and maintaining, and decommissioning the Project over its planned lifetime within the context of Nye and Clark counties' economies. The assessment estimated the direct impacts resulting from the development of the Project as well as the indirect and induced impacts. Direct effects represent the initial change in the industry in question while indirect effects are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries.

Induced effects reflect local spending changes resulting from income changes in the directly and indirectly affected industry sectors.

The analysis uses the latest version of IMPLAN, which currently incorporates 546 industry sectors as defined by the Bureau of Economic Analysis. The latest IMPLAN datasets are from 2020; however, as result of the global pandemic, the 2020 data contains various anomalies and is less representative than the 2019 data for modeling economic impacts. Thus, 2019 was used as the “data year” of the IMPLAN model. The modeling outcome and detailed methodology are provided in the technical report Rough Hat Clark Solar Project Economic and Fiscal Impact Assessment (Triple Point Strategic Consulting 2022).

The proposed Project is in western Clark County, near the Nye County line. Although Clark County’s population and economic resources are significantly greater than those of Nye County, given the location’s proximity to the town of Pahrump in Nye County, Project construction and operation are anticipated to draw workers from both counties.

The analysis defines *temporary impacts* as those occurring within the 12- to 18-month construction period. Long-term impacts are those that would occur during the 30-year operation period.

For the social cost of carbon calculation, the EIS uses the Social Cost of Carbon Dioxide Calculator developed by the BLM in 2021. The analysis below presents separate estimates for the construction phase and the operations and maintenance phase of the Proposed Action and Alternative 1 because of the difference in carbon emissions for each phase.

3.13.5 Proposed Action

Construction Impacts

Employment and Income

The workforce at the Project site during the 12- to 18-month construction period would average 400 workers, with a peak of up to 555 workers during the most intense construction activity. Most construction staff and workers would be expected to come from the labor pool present within Clark County, particularly the Las Vegas area. Given the size of the new power construction and solar electric generation sectors in each county, construction could draw 5 percent of the direct employment from Nye County (Triple Point Strategic Consulting 2022). The necessary workforce could be accommodated locally due to the level of unemployment and presence of construction workers. Construction of the Proposed Action could temporarily decrease the level of unemployment by 0.5 percent in Clark County and by 1.2 percent in Nye County. The effects of the Proposed Action on regional unemployment would be a minor 0.5 percent decrease but would be beneficial.

Table 3.13-6 summarizes the direct, indirect, and induced economic impacts during construction of the Project for Nye County and Clark County. The Project would generate approximately 800 average annual jobs in Clark County and approximately 35 average annual jobs in Nye County for the duration of construction. The total economic output from Project construction is approximately 276 million in Clark County and approximately 12 million in Nye County (Triple Point Strategic Consulting 2022). The effects to the regional economy as a result of the Proposed Action would be beneficial.

Table 3.13-6 Clark County and Nye County Construction Impacts by Type and Category, 2022 Dollars (thousands)

Type impact	Labor incomes	Average annual jobs	Intermediate expenditures	Other property income	Taxes on production	Total output
Clark County						
Direct	$66,821	521	$61,305	$43,172	$4,262	$175,560
Indirect	$12,986	102	$17,404	$6,330	$3,168	$39,888
Induced	$17,602	177	$24,433	$14,229	$4,353	$60,617
Total	**$97,409**	**800**	**$103,142**	**$63,731**	**$11,783**	**$276,065**
Nye County						
Direct	$3,773	25	$2,941	$2,321	$205	$9,240
Indirect	$365	4	$814	$143	$186	$1,508
Induced	$473	6	$814	$437	$173	$1,897
Total	**$4,611**	**35**	**$4,569**	**$2,901**	**$564**	**$12,645**

Source: (Triple Point Strategic Consulting 2022)

Tourism and Recreation-related Economic Inputs

The Project site is minimally used for recreation. The Pahrump Valley and surrounding areas are used for recreation and tourism. Nearby recreational activities, such as off-highway vehicle recreation or hiking, may be impacted by the Proposed Action due to the visual change from undeveloped land to a renewable development facility. One recreational trail crosses the Project site and would be unavailable for recreational use during construction and for the life of the Project. Views of the Project would change the recreational experience from the current views of Pahrump Valley. However, ample recreational opportunities and trails are available within the vicinity of the Project area and regionally. Traffic increases generated by Project construction could temporarily affect access to recreational opportunities near the Project area by causing traffic delays. The increase in vehicle traffic and traffic delays during Project construction would be temporary and a Traffic Management Plan required as part of the BLM ROW grant would implement protocols to reduce any potential traffic impacts during construction. Given the size of the Pahrump Valley and the surrounding natural environment, the Proposed Action would not be expected to induce a substantial loss of recreation and tourism and associated economic loss. Additionally, the Project is subject to the Solar PEIS Project Design Feature (PDF) S1-1, which includes methods to minimize socioeconomic effects, such as developing a community monitoring program to gather data regarding the economic, fiscal, and social effects of a project or establishing vocational training programs to promote development of skills required by the solar industry. No substantial adverse effects to tourism and recreation-related economic inputs from the Proposed Action would occur.

Housing

It is anticipated that most of the construction workers would commute daily and could carpool from nearby communities (e.g., Las Vegas, town of Pahrump) and would not require temporary housing. As shown in Table 3.13-5, there are approximately 2,630 units in the town of Pahrump and 15,926 units in the city of Las Vegas that are vacant and could accommodate the temporary relocation of workers for

Project construction. No substantial adverse effects to regional housing from Project construction would occur.

Access to Local Emergency Services

The BLM and local emergency services would have emergency access to the Project site via a locked gate to facilitate response time for wildfire and non-wildfire incidents. Emergency services may be required in the event of a worker accident or injury, hazardous material spill, or wildfire ignition. As discussed in Section 3.9: Public Health and Safety, SR 160 serves as the regional evacuation route and would be the primary access route for Project employees and emergency service providers, in the event of an emergency. Implementation of Solar PEIS PDF HMW 1-1 requires preparation of an Emergency Response Plan. The Emergency Response Plan would identify evacuation routes for construction personnel during an emergency, communication protocols, and notifications.

A Fire Management Plan required as part of the BLM ROW grant would be implemented for the life of the Project to reduce fire risk to the Project area and surrounding public lands. During Project construction, a water truck or portable trailer-mounted water tank would be kept on site in the event of a small human-caused fire onsite. The BLM may implement fire restrictions during Project construction to reduce the risk of human-caused fires during periods of high fire danger. All wildland fires would be reported to the BLM via the Las Vegas Interagency Communication Center or local 911 emergency services.

Property Values

The 2012 Solar PEIS identifies scenarios in which neighboring property values would be negatively or positively impacted (Triple Point Strategic Consulting 2022). The PEIS confirms there is very little research and little evidence of solar facilities impacting local property values. The PEIS also notes that property values could decline based on perceptions of whether a facility could adversely affect the environment or local economic development. Property values could decrease during construction due to real or perceived impacts to aesthetics, health, traffic congestion, air quality, or other resources. Several studies have since been conducted on the impact of utility-scale solar facilities on property values. A 2018 study found that large solar facilities have very little impact on nearby residential home values and noted that 24 homes on average are located within 3 miles of a large solar facility in rural locations (Al-Hamoodah et al. 2018). Other studies found slight declines in property values surrounding solar facilities. A 2020 study of solar facilities in Massachusetts and Rhode Island found property values declined by 1.7 percent on average. However, the negative effects were substantially larger for properties within 0.1 mile of solar facilities in non-rural areas (Gaur and Lang 2020). A 2022 study found homes within 0 to 0.5 mile of a large-scale solar facility resulted in an average 1.5 percent decrease in sale price (Elmallah, et al. 2022). The study also found that the average decline in property values was higher at closer distances to the solar site and for homes in rural agricultural settings around larger projects (Elmallah, et al. 2022). These studies imply that solar facilities could have a 1 to 2 percent decrease on property values within 1 mile of large-scale solar facilities.

Construction of the Project would be temporary and last approximately 12 to 18 months. Construction of the Project could decrease property values of homes within 1 mile of the Project site; however, there are no homes within at least 2 miles of the Project site. No substantial adverse effects to property values would occur.

Social Impacts

Construction of the Project would have short-term beneficial contributions to the local and regional economy. Workers would support local businesses in the town of Pahrump and other nearby communities during construction. While 5 percent of the construction workers would be sourced from the town of Pahrump, the increased local employment would improve residents' standard of living. As discussed above, most workers would commute from Clark County and the Las Vegas metropolitan area and would be unlikely to use social services (e.g., schools, health care) within close proximity to the Project site.

Project construction could affect the social character and community values of the town of Pahrump. Studies have shown that local opposition to solar projects stands in contrast to the general societal acceptance of renewable energy projects (O'Shaughnessy, et al. 2022). Perceived aesthetic, economic, and environmental impacts are the primary driving factors of local oppositions to solar projects, particularly when the impacts occur near populated areas, cultural areas, recreational areas, and natural ecosystems (O'Shaughnessy, et al. 2022). Renewable energy projects are generally sited in areas with low population densities and undeveloped lands. While construction activities would be short-term, the Project would permanently change the landscape from undeveloped to developed. Consequently, local rural communities (e.g., town of Pahrump) could bear the burden of the external costs for renewable energy development. Residents within the Pahrump Valley have expressed concerns for how the Project would alter the social character of the community. During the public scoping meetings held in November 2022 for the Proposed Action, comments were received from members of the public concerning the permanent changes in scenery, biological resources, air quality, recreational areas, and socioeconomics that would result from construction of the Project.

Social Cost of Carbon

As discussed in Section 3.6, Climate Change, a one-time generation of GHG emissions from the Proposed Action would be required to construct the facility. The annual construction emissions were used in the Carbon Dioxide Calculated and the results are shown in Table 3.13-7.[3]

Table 3.13-7 Social Cost of Carbon Associated with Project Construction in 2023 Dollars

	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate	95th Percentile Value, 3% discount rate
Total (in $2023) for all carbon dioxide emissions	$366,297	$1,263,691	$1,874,474	$3,785,109

These estimates represent the present value of future market and nonmarket costs associated with carbon dioxide emissions during construction of the Project. Estimates are calculated based on the Interagency Working Group's (IWG) estimates of social cost per metric ton of emissions for a given emissions year and BLM's estimates of emissions in each year.

One key parameter in the IWG's SC-GHG models is the discount rate, which is used to estimate the present value of the stream of future damages associated with emissions in a particular year. A higher

[3] The Interagency Working Group recommends including calculations for carbon dioxide, methane, and nitrous oxide. The calculation for the Project used carbon dioxide equivalents (CO_2e) rather than presenting methane and nitrous oxide independently, so all emissions have been shown in the carbon dioxide calculator.

discount rate assumes that future benefits or costs are more heavily discounted than benefits or costs occurring in the present (i.e., future benefits or costs are a less significant factor in present-day decisions). The current set of interim estimates of SC-GHG have been developed using three different annual discount rates: 2.5%, 3%, and 5%.

The first three estimates reflect the average damages from multiple simulations at each of the three discount rates. The fourth value represents higher-than-expected economic impacts from climate change. Specifically, it represents the 95th percentile of damages estimated, applying a 3% annual discount rate for future economic effects. This is a low probability, but the high damage scenario represents an upper bound of damages within the 3% discount rate model. As shown, the Project would result in a social cost of between $366,297 and $3,785,109 during construction.

Operation and Maintenance Impacts

Employment and Income

Project operations and maintenance would require up to 10 permanent employees. The Project is expected to operate for at least 30 years. The increase in permanent jobs would minimally reduce unemployment in Clark and Nye counties. 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 annual economic output from Project operations would be approximately 11 million in Clark County and 3 million Nye County, refer to Table 3.13-8. The effects to the regional economy as a result of constructing the Project would be beneficial.

Table 3.13-8 Clark County and Nye County Annual Operation Impacts, 2022 Dollars (thousands)

Type impact	Labor incomes	Intermediate expenditures	Other property income	Taxes on production	Total output
			Clark County		
Direct	$850	$3,360	$1,700	$870	$6,780
Indirect	$610	$1,510	$650	$200	$2,970
Induced	$320	$450	$260	$80	$1,110
Total	**$1,780**	**$5,320**	**$2,610**	**$1,150**	**$10,860**
			Nye County		
Direct	$330	$1,010	$660	$260	$2,260
Indirect	$129	$486	$170	$66	$851
Induced	$53	$91	$49	$19	$212
Total	**$512**	**$1,587**	**$879**	**$345**	**$3,323**

Source: (Triple Point Strategic Consulting 2022)

Tourism and Recreation-related Economic Inputs

Similar to Project construction, effects to tourism and recreation-related economic inputs would be driven by the change in visual setting from an undeveloped area to a solar facility. Given the size of the Pahrump Valley and the surrounding natural environment, the Proposed Action would not be expected to induce a substantial loss of recreation and tourism or associated economic loss. No substantial adverse effects to tourism and recreation-related economic inputs from Project operation would occur.

Housing

Similar to Project construction, it is likely that operational workers would commute daily and could carpool from nearby communities. If operational workers move into the analysis area from elsewhere, rental vacancy of approximately 3,428 units in Nye County and 71,768 in Clark County could accommodate a nominal increase in permanent employees.

Access to Local Emergency Services

Impacts to local emergency services during operation and maintenance of the Project would be similar to those described above for construction. The BLM and emergency responders would have access to the Project site via a locked gate. Project operations would typically have a low risk of fires due to the majority of materials within the solar arrays being non-combustible. The Fire Management Plan would be implemented for Project operations. Vegetation around buildings and equipment would be maintained, and fire protection systems would be included for the administration/operations and maintenance building. The Clark County Rural Fire Department and Pahrump Valley Fire and Rescue would provide firefighting services for non-wildfire emergencies at the Project site. Fencing and controlled access gates would provide security for the Project site and would minimize the need for police services.

Property Values

Commercial operation of the Project would last approximately 30 years. As discussed above, negative effects to property values from utility-scale solar facilities could occur for homes within 1 mile of the Project area. The decrease in property values is higher for properties closer to the solar facility (Al-Hamoodah, et al. 2018, Elmallah, et al. 2022). There are no residences within 2 miles of the Project site. Therefore, no substantial adverse effects to property values from Project operation would occur.

Social Impacts

Project operations and maintenance would require 10 permanent employees. The influx of 10 employees would not substantially contribute to local or regional economies. Employees would likely commute daily from nearby communities. If employees were to move into the analysis area, there would be a minor increase in support for local businesses. Employees living in the analysis area may require the of social services. However, the 10 permanent employees would be accommodated by existing social services, and new or additional social services would not be required.

As discussed above, the Project could affect the social values and character of communities within close proximity to the Project site (i.e., town of Pahrump). The Project is sited in a rural, undeveloped area within 3 miles of the town of Pahrump. Operation and maintenance of the Project would last approximately 30 years and would permanently change the landscape from undeveloped to developed. Residents in surrounding communities, primarily the town of Pahrump, expressed concerns about the change in the scenery and community due to the solar facility. The long-term impacts to visual, biological, water, and recreational resources would have negative effects on the social value of the community. Substantial adverse effects to social values from Project operations would occur.

Social Cost of Carbon

As discussed in Section 3.6, Climate Change, the operation of the Project would generate minimal GHG emissions and would offset a significant quantity of GHG emissions compared to the equivalent GHG emissions from energy generated at a fossil fuel-fired power plant. While the estimate of emission offsets is based on equivalent energy production and does not account for potential substitution across fuel markets or changes in overall energy demand due to the Project, renewable energy with storage is a means of reducing the generation of new fossil fuel projects and meeting climate change goals. As such, for informational purposes, this EIS calculated the social cost of the offset of carbon from the Project when compared to the same energy being produced by a fossil fuel power plant, as shown in Table 3.13-9.

Table 3.13-9 Social Cost of Carbon Associated with Project Operations in 2023 Dollars

	Average Value, 5% discount rate	Average Value, 3% discount rate	Average Value, 2.5% discount rate	95th Percentile Value, 3% discount rate
Total (in $2023) for all carbon dioxide emissions	-$130,894,140	-$512,651,120	-$781,182,688	-$1,562,188,114

These estimates represent the present value of future market and nonmarket benefits associated with the reduction of carbon dioxide emissions during operations of the Project. As shown, the Project would result in an overall social benefit due to the reduction of carbon of between -$130,894,140 and -$1,562,188,114.

Decommissioning Impacts

The workforce and length of time required for decommissioning activities is expected to be one-third that for 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 to regional employment as a result of decommissioning the Proposed Action would be beneficial. Economic output would be beneficial during decommissioning; however, after decommissioning, the 10 jobs associated with operation and maintenance would be lost. No impacts to housing or public services would occur.

Cumulative Impacts

Many of the cumulative solar projects adjacent to the Project area could be constructed simultaneously, requiring a large construction workforce and temporary housing. A small workforce would be needed to operate some of the cumulative projects, primarily the energy projects. Cumulative projects whose construction overlaps with the Project's construction would have similar socioeconomic effects as the Proposed Action. The construction industry employs approximately 72,716 persons in Clark County and 1,269 persons in Nye County (U.S. Census Bureau 2020). The Copper Rays Solar Project and Golden Current Solar Project would require up to 400 workers and 1,000 workers during construction, respectively. The combined workforce required for the Copper Rays, Golden Currant, and Rough Hat Clark Solar Projects would be less than 3 percent of the total number of construction workers in Clark and Nye counties. It is assumed that other cumulative solar projects (Mosey, Canyon Mesa, Larrea, Borderline Solar, Sun Baked Solar, and Bonanza Peak) would require a similar number of construction workers as the Copper Rays and Golden Current Solar Projects. The construction workforce of Clark County and

Nye County would be able to accommodate cumulative solar projects constructed simultaneously. Cumulative demand for construction workers would not exceed the available workforce.

While most workers would likely commute from Las Vegas or Pahrump CDP, vacant units available in Clark County (78,000 units) and Nye County (3,980 units) could accommodate a temporary influx of construction workers. Permanent positions required for operation of the Project would likely be sourced from individuals already living in Clark County or Nye County. Construction of the cumulative projects would positively affect the economy by providing jobs and from workers spending money locally.

Cumulative solar projects (Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Borderline Solar, Sun Baked, Bonanza Peak, and Yellow Pine) in combination with the Project could eventually cover approximately 31,340 acres of the Pahrump Valley, which would change the recreational setting as discussed in Section 3.10: Recreation. If recreationalists decide to recreate elsewhere, cumulative development could result in a loss of tourism and recreation-related economic inputs, most notably to the town of Pahrump. The bulk of the recreational opportunities highlighted by the town of Pahrump would be expected to have minimal effects from the development of Pahrump Valley because they are in the town of Pahrump itself, such as with casinos and wineries, or are in the surrounding mountains, such as with equestrian tours, hiking, or adventure tours. Off-highway vehicle use could cumulatively lose approximately 67 miles of trails as discussed in Section 3.10: Recreation. Loss of off-highway vehicle recreationists could result in an associated loss of recreation-related economic input from this industry, an adverse cumulative effect. Solar PEIS PDF S1-1 would be required for some of the cumulative solar projects, where subject to the Solar PEIS, and would minimize adverse effects by developing outreach programs and supporting training local labor for work in the solar industry.

The cumulative solar projects would require similar access to local emergency services as the Proposed Action. As discussed above, workers for construction and operation of the Project would likely be sourced locally from Clark and Nye counties. Because of the proximity of the cumulative projects and because each project is fenced independently, the cumulative build out of the Pahrump Valley could restrict access for response to an emergency if the emergency crosses project fences, such as would be anticipated in a wildfire. This is especially the case between the Proposed Action, the Copper Rays Project, and the Mosey Project because they share a border. Secondary access, such as gates, between projects would reduce the effect by allowing the emergency responders to pass from one project to the next without requiring the responders to drive completely around each individual project to the adjacent project's entryway.

Implementation of the cumulative solar projects in the Project vicinity would not result in a substantial increase in the population and/or a demand for emergency services. Cumulative solar projects constructed on BLM-owned land would also be required to adhere to any BLM fire restrictions and provide access to the BLM in the event of a wildland fire.

Due to the proximity of the cumulative projects, the cumulative build out of the Pahrump Valley could decrease property values of the area. The decrease in property values is higher for properties closer to the solar facility (Al-Hamoodah, et al. 2018, Elmallah, et al. 2022). Additionally, property values could decrease from perceived environmental or economic impacts from cumulative projects. Several projects are within 1 mile of private residences: the proposed Mosey Project is approximately 1 mile from the Front Sight area, the proposed Copper Rays project is within 1 mile of residential areas in the southwestern portion of Pahrump, and Borderline Solar in California is within a mile of the southeastern area of Pahrump. The decrease in property values would last for the lifespan of the cumulative projects for the homes within 1 mile of the cumulative solar projects. The larger community within the town of Pahrump would not experience substantial decreases in property values.

Each of the cumulative projects would result in GHG emissions which would translate into a cumulative social cost. However, while it is not possible to calculate the social cumulative cost of the cumulative projects without knowing the associated GHG emissions, it can be noted that the cumulative solar projects, (Copper Rays, Golden Currant, Mosey, Canyon Mesa, Larrea, Borderline Solar, Sun Baked, Bonanza Peak, and Yellow Pine) in combination with the Project, would all result in a cumulative benefit to the social cost of carbon due to the reduction in fossil-fuel power plant use. The cumulative impacts to socioeconomics would not be substantial.

3.13.6 Alternative 1 – Resources Integration Alternative

Construction, Operations and Maintenance, and Decommissioning Impacts

Under Alternative 1, overland travel would be required during Project construction. Operation, decommissioning methods, scheduling, and personnel would remain the same as the Proposed Action. The affected area for Alternative 1 would remain the same as the Proposed Action. The social cost of carbon during construction is anticipated to be the same because the equipment anticipated for use during the construction would be the same and is the primary generator of the carbon emissions. The social benefit of carbon reducing during operations is anticipated to be the same or slightly improved between while the amount of renewable energy generated would be the same, with reduced grading and increased use of overland travel method for development of Alternative 1, the loss of carbon sequestration would be anticipated to be less which would result in a slightly higher offset of carbon and associated benefit to the social cost of carbon. Therefore, impacts to socioeconomics would be the same as the Proposed Action.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects in the Nevada portion of the Pahrump Valley incorporate similar construction techniques as the Resources Integration Alternative to reduce effects to habitat in the Pahrump Valley. It does not assume similar construction techniques for projects in California as they are governed by a different management plan and under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. The cumulative effects of the alternative combined with the build-out of the Pahrump Valley with solar development following resources integration methodologies would be the same as the cumulative analysis of the Proposed Action because the projects would require the same construction and operations workforce and would be fenced. The cumulative impacts to employment, income, tourism and recreation, housing, access to local emergency services, property values, social impacts, and social cost of carbon would be the same as the Proposed Action.

3.13.7 No Action Alternative

The Project would not be constructed under the No Action Alternative. The populations of Nye and Clark counties are expected to continue to increase to 51,000 and 2.4 million persons by 2025, respectively (Lawton 2021). Employment in the Nye County and Las Vegas metropolitan areas are also expected to increase by approximately 0.2 percent per month (Triple Point Strategic Consulting 2022). By 2025, the mean forecast of monthly employment is 18,300 employees in Nye County and 1.2 million employees in the Las Vegas metropolitan area (Triple Point Strategic Consulting 2022). Employment in Clark County is projected to increase by 0.5 percent annually and is forecasted to employ approximately 1.5 million persons by 2025 (University of Nevada Las Vegas 2021). The total economic output for Clark County was approximately 216 billion in 2021 and is projected to increase to approximately 507 billion by 2060 (University of Nevada Las Vegas 2021). Economic output trends for Nye County are unavailable at this time. No socioeconomic impacts would occur.

3.13.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) are summarized in Appendix B. The Project would comply with the following Solar PEIS PDFs to minimize adverse impacts to socioeconomics:

Solar PEIS Programmatic Design Features

- PDF S1-1: Project developers shall coordinate with the BLM and other federal, state, and local agencies to identify and minimize potential socioeconomic impacts.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Fire Management Plan
- Emergency Response Plan
- MM EJ-1: The proponent or its subcontractor shall hold at least one job fair for communities near the project site with the goal of hiring locally for the project workforce. The proponent or its subcontractor may also hire through local trade organizations.

3.13.9 Irreversible and Irretrievable Impacts

There are no irreversible or irretrievable impacts that would affect socioeconomic conditions.

3.14 Soils and Paleontological Resources

3.14.1 Introduction

This section identifies the soils and paleontological resources within and adjacent to the Project site that would be affected by construction, operation and maintenance, and decommissioning activities. Soil resource inventory data for the analysis area were gathered from two primary sources: 1) U.S. Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) (NRCS 2022), which delineates unique soil map units and 2) *The Integrated Vegetation Survey Report* (Heritage Environmental Consultants 2021), which identifies the presence of biological soil crust and desert pavements.

The BLM has no singular piece of legislation that provides for soil protection. However, soils are intricately linked to the Clean Water Act (CWA) and Clean Air Act (CAA), and soil conservation is specifically cited in the FLPMA, and the Taylor Grazing Act of 1934. In addition to the legislation applicable to soils, the BLM is required to follow standards and guidelines consistent with 43 CFR 4180.1 – Fundamentals of Rangeland Health. The BLM Soil Resources Program has developed 5-year strategies for management and conservation of soil resources on BLM-administered lands to meet these requirements (Davis, McCormick and Ford 2015).

The BLM Paleontology Program works to preserve and protect paleontological resources, in accordance with the Paleontological Resources Preservation Act of 2009 and 43 CFR Part 49 – Paleontological Resources Preservation, which provide BLM-specific guidance for preserving, managing, and protecting paleontological resources on BLM-administered land. Regulations and laws pertaining to soils and paleontological resources that apply to the Project are provided in Appendix C.

3.14.2 Analysis Area

The analysis area for soils and paleontological resources is limited to the Project site and gen-tie lines with a 200-meter buffer around the site, consisting in total of approximately 2,967 acres of federal land managed by the BLM in the Pahrump Valley of Clark County. This geographic extent is appropriate because effects of the Project's construction and operation may result in erosion that could impact areas downstream of the Project site. The analysis area is used to provide context for current conditions and, ultimately, for the direct, indirect, and cumulative impacts related to loss of soil resources or productivity.

3.14.3 Affected Environment

Soil Types

The three major soil types in the Project site are Commski-Lastchance (Site 202), Commski-Oldspan Lastchance (Site 203), and Lastchance-Commski (Site 185). Refer to Table 3.14-1 for a description of the soil properties. Lastchance is an endemic soil that occurs only in Nevada. The soils vary from very gravelly to extremely gravelly sandy loam to very fine sandy and silt loam textures, with some thicker cemented materials (i.e., petrocalcic horizons). Most soils are well drained with moderate to high permeability (NRCS 2023). Commski–Oldspan–Lastchance, Commski–Lastchance, and Lastchance-Commski associations occur along fan remnants and consist of non-saline to moderately saline soils derived from limestone and dolomite parent materials.

Table 3.14-1 Soil Types (Erodible Soils and Corrosive Soils) within the Project Site

Soil type	Acres	Percent of analysis area	Natural drainage class/runoff class	Water erosion (maximum K factor)	Wind erodibility group (minimum WEG) *	Soil corrosion potential (maximum)	Soil productivity (minimum T factor)
Lastchance -Commski association	123.8	5.1%	Well drained/high	.05	8	Steel: high Concrete: moderate	2
Commski-Lastchance association	1,789 .8	73.4%	Well drained; well drained /medium; high	.10	6	Steel: high Concrete: moderate	5
Commski-Oldspan-Lastchance association	525.9	21.6%	Well drained /medium; low; high	.10	6	Steel: high Concrete: moderate	5

Source: (Heritage Environmental Consultants 2021)

Biological Soil Crust and Desert Pavement

Biological soil crust and desert pavement commonly occur as a mosaic covering arid soil surfaces. Desert pavement is a matrix of rock fragments that form smooth, pavement-like surfaces. Desert pavement is typically devoid of both native and non-native species and vegetation species for large swaths of land. Biological soil crusts are "living" surface features comprising soil particles enmeshed in a complex web of cyanobacteria, mosses, lichens, bacteria, algae, and fungi. Both desert pavement and biological soil crust provide a protective layer that reduces wind and water erosion potential and further impacts soil moisture dynamics. Disruption of fragile biological soil crust or removal of desert pavement generally increases wind and water erosion potential. The *Rough Hat Solar Project Integrated Vegetation Survey Report* (Heritage Environmental Consultants 2021) estimated 24 acres of biological soil crust (1 percent of the Project site) and 998 acres of desert pavement (41 percent of the site) within the three soil types found on the Project site.

Soil Stability

Water Erosion (K-Factor)

The *soil erodibility factor* (known as the *K factor*) is used to quantify a soil's susceptibility to water erosion in two erosion models: the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE2) (USDA 2019a). K factor values range from 0.02 (least erodible soils) to 0.64 (most erodible soils). The NRCS assigns two separate K factors to SSURGO-level soil map units (USDA 2019b): 1) The *Kf factor* applies to fine-grained surface soils (i.e., soil particles less than 2.0 mm in diameter); 2) The *Kw factor* applies to fine-grained surface soils adjusted for the impacts of rock fragments. Soil unit erodibility potential can be categorized in one of the following: 1) low erodibility: Kf or Kw between 0.02 and 0.24; 2) moderate erodibility: Kf or of Kw between 0.25 and 0.4; or 3) high erodibility: Kf or Kw greater than 0.4 (Michigan State University 2002). All soil types within the analysis area have low water erodibility potential, as shown in Table 3.14-1.

Wind Erosion (Wind Erodibility Groups)

The purpose of *wind erodibility groups* (WEGs) is to predict a soil type's susceptibility to wind erosion, which varies according to soil texture, organic matter content, soil carbonate, rock fragment content, and mineralogy. WEG values are assigned to soil map units within the SSURGO system and range from a value of 1 to 8: high wind erosion susceptibility (WEG 1 or 2), moderate wind erosion susceptibility (WEG 3, 4, or 4L), slight wind erosion susceptibility (WEG 5, 6, or 7), and no susceptibility to wind erosion (WEG 8) (NRCS 2022). As shown in Table 3.14-1, the WEGs for the on-site soils range between 6 and 8, which represents a slight to no susceptibility to wind erosion.

Soil Corrosion Potential

The risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete and uncoated steel. Potential corrosion of both concrete and uncoated steel is assigned by the USDA into three categories— low corrosion potential, moderate corrosion potential, and high corrosion potential—which are assigned at the soil map unit level within the SSURGO system, see Table 3.14-2 (NRCS 2022). All the soil types within the Project site have one or more components with high steel corrosion potential. Soils within the analysis area have a moderate concrete corrosion potential.

Table 3.14-2 Risk of Corrosion of Uncoated Steel and Concrete

Property	Limits		
	Low	**Moderate**	**High**
Uncoated Steel			
Drainage class and texture	Excessively drained, coarse textured soils; well drained, coarse textured to medium textured soils; moderately well drained, coarse textured soils; or somewhat poorly drained, coarse textured soils	Well drained, moderately fine textured soils, moderately well drained, medium textured soils; somewhat poorly drained, moderately coarse textured soils; or very poorly drained soils with a stable high-water table	Well drained, fine textured or stratified soils; moderately well drained, fine textured and moderately fine textured or stratified soils; somewhat poorly drained, medium texture to fine textured or stratified soils; or poorly drained soils with a fluctuating water table
Total acidity (meq/100g)	<8	8-12	>12
Resistivity at saturation (ohm/cm)	>5,000	2,000-5,000	<2,000
Conductivity of saturated extract (dSm-1)	<0.3	0.3-0.8	>0.8
Concrete			

Property	Limits		
Texture and reaction	Sandy and organic soils with pH of >6.5 or medium and fine textured soils with pH of >6.0	San and organic soils with pH of 5.5-6.5 or medium textured and fine textured soils with pH of 5.0 to 6.0	Sandy and organic soils with pH of <5.5 or medium textured and fine textured soils with pH of <5.0
Na and/or Mg sulfate (ppm) in soil	Less than 1,000	1,000 to 7,000	More than 7,000
NaCl (ppm) in soil	Less than 2,000	2,000 to 10,000	More than 10,000

Source: (USDA, 2004)

Soil Productivity (T factor, Soil Loss Tolerance)

An important factor in the consideration of soil productivity are thresholds for soil loss due to erosion. The *T factor* is defined as the soil loss tolerance (as measured in tons per acre), which is the maximum amount of soil erosion at which the quality of a soil as a medium for plant growth can be maintained. The erosion losses are generally defined by USLE or RUSLE2. Erosion classes range on a scale of 1 to 5, with the 5 being the most resilient to future erosional losses of soil and 1 being the least resilient (NRCS 2022). For the purposes of this analysis, T factor classes of 1 to 2 are considered to have low soil loss tolerance (i.e., highly susceptibility to erosion impacts and loss of soil productivity). Approximately 95 percent of soils within the analysis area are rated as class 5, which represents a low susceptibility to erosion. The remaining 5 percent of on-site soils have a high susceptibility to erosion impacts (class 2) (refer to Table 3.14-1).

Paleontological Resources

Paleontological resources are the fossilized remains of extinct organisms and provide the only direct evidence of ancient life. The BLM uses the Potential Fossil Yield Classification (PFYC) system to assess potential occurrences of paleontological resources and evaluate possible impacts from land management actions (BLM Handbook 8270-1, Paleontological Resource Management). Using the PFYC system, geologic units are classified based on the relative abundance of paleontological resources and their sensitivity to adverse impacts (BLM 2022), including those from ground-disturbance activities. This classification is applied to the geologic formation, member, or other mapped unit. The Project site is located within a PFYC Class U – Unknown Potential unit (PFYC-U). An assignment of PFYC-U often results because the unit or area is poorly studied. These geological units may exhibit features or conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known. Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns. Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

Geologic units within the Project site are primarily Holocene and late Pleistocene young alluvium (Qay) and late and middle Pleistocene intermediate alluvium (Qai). Deposits of young alluvium (post-Pleistocene) or thick soils can often be disregarded for fossil potential. However, geologic mapping may not separate the older Pleistocene alluvium which may contain significant vertebrate fossils, and thus these units need to be carefully considered (BLM 2016). A mammoth tusk was discovered in Unit E of

Haynes (1967) and Quade (1986) (early Holocene to latest Pleistocene) just north of Cathedral Canyon (Spaulding and Quade 1996), approximately 3 miles south of the Project site.

3.14.4 Environmental Consequences

Methodology

To conduct the analysis, the SSURGO soils data (NRCS 2022) were first overlaid with the analysis area. Acreages of different sensitive soil attributes (i.e., biological soil crust, desert pavement, erodible soils, and corrosive soils) within the Project site were calculated. Where attributes were given as numerical values or indices, ranges of data were classified as high, moderate, and slight or low, and acreages of high potential risk or susceptibility are provided for the Proposed Action and each alternative. A qualitative analysis was also completed to assess the relative impacts of the proposed site preparation methods on soil and vegetation resources, which would vary among the alternatives. Table 3.14-3 provides the acreages of each construction type per action alternative as well as the effects on soil for each construction type.

Table 3.14-3 Alternative 1 Disturbance Areas Compared to the Proposed Action

Construction type	Effects on soils	Proposed Action (acres)	Alternative 1 (acres)
D-0 (avoidance)	No disturbance as the areas would not be developed.	519	520
D-1 (overland travel)	Soil would be minimally compacted by construction equipment. Vegetation would remain intact above ground with the ability to recover after construction; if vegetation is crushed, it mostly survives. Effects would be temporary.	0	962
D-2 (clear and cut/ drive and crush)	Soil would be heavily compacted, and vegetation would be mostly removed. Vegetation root masses would remain largely intact but would experience slower recovery due to compaction and loss of vegetation. Seed bank may remain within the soil but would have been compacted. Effects would be temporary.	1,301	617
D-3 (clear and cut with soil removal)	Vegetation and soils would be cleared and removed where necessary. Natural regrowth of vegetation would be limited. Soils would be stockpiled, stored, and managed on-site for possible future use. Effects would be longer term.	649	406
Total		**2,469**	**2,469**

For paleontological resources, the BLM National PFYC Geologic Formation Map Index 2022 dataset was applied to the analysis area, and a literature review was performed for potential resources found in the area.

3.14.5 Proposed Action

Construction Impacts

The Proposed Action would cause variable levels of construction disturbance within the 2,469-acre Project site, which includes areas for solar arrays, energy storage facilities, ancillary facilities, access roads, acceleration and deceleration lanes along the SR 160, and auxiliary power/telecommunications line. Table 3.14-3 lists the acres of construction methods for the Proposed Action. The definitions for the types of construction methods are provided in Section 2.2.

Native vegetation would be avoided to the maximum extent possible by defining clear travel paths throughout the site and vegetation would be retained in any areas not directly needed for construction or operation and maintenance. All other vegetation outside of construction areas would be left intact. Project-specific exceptions to the targets in Table 3.14-3may occur with the BLM's approval, but only if justification to BLM's satisfaction can be demonstrated based on site-specific conditions and construction needs—for example, if topographical features were more challenging than expected, or if subsurface conditions require more vehicle trips for array installation than anticipated.

Erosion

The Proposed Action components would result in temporary and permanent disturbance within the analysis area. Soils in the Project site have the potential to erode from both wind and heavy rainfall. Traditional construction methods would include grading up to 649 acres of surface soils, which would result in the loss of topsoil. Surface disturbance and the removal of vegetation during construction would increase the potential for soil erosion, in particular for areas of desert pavement, which are estimated to cover 41 percent of the analysis area, or an estimated 998 acres. A Stormwater Pollution Prevention Plan (SWPPP) or equivalent required as part of the BLM ROW Grant would be prepared and implemented during construction and would include installation of Project-specific erosion control BMPs (as identified in the SWPPP or equivalent). The Solar PEIS PDF SR2-1 requires salvaging topsoil from all excavation and construction and reapplying it to disturbed areas. SNDO-required PDFs SR1, SR2, SR3, and SR4 outline topsoil salvage procedures, such as the stockpile and separation of topsoil based on different soil types. Implementation of the PDFs would ensure that topsoil is not mixed with subsoil and that it is managed properly for eventual reuse. Solar PEIS PDF SR2-1 also includes BMPs to minimize soil erosion. The Project BMPs identified in the POD, including installation and routine maintenance of erosion and sediment controls, would be implemented throughout construction.

Temporary disturbance areas (approximately 35 acres) include temporary workspaces, yards, and staging areas as well as temporary tortoise fencing needed for construction. Temporary areas of disturbance would be restored in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan following the completion of primary construction activities as required as part of the BLM ROW Grant. Permanent disturbance (1,950 acres) is associated with all long-term Project components needed for operation and maintenance of the Project and associated facilities throughout the 30-year lifespan of the Project, including the solar arrays, energy storage system, roads and access routes, distribution power, substations, gen-tie and transmission infrastructure, and permanent fencing. These areas would be reclaimed after the Project's 30-year lifespan, and reclamation would occur in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan. Some of these areas, such as access routes, may be reclaimed earlier after they are no longer actively used for construction. Part of the Site Restoration-Revegetation & Decommissioning-

Reclamation Plan would include using the salvaged and managed topsoil, as required by Solar PEIS PDF SR2-1, and as detailed in SNDO-required PDFs SR1, SR2, SR3, and SR4.

Appropriate dust abatement measures would be identified in the Dust Control Plan, to be implemented during construction, in compliance with the Dust Control Permit from Clark County Department of Air Quality. These measures would include BMPs such as restriction of vehicle speeds, watering of active areas, watering of stockpiles, watering on roadways, track-out control at site exits, and other measures as required by the BLM and as listed in the Solar PEIS PDFs. Dust palliatives may be used with approval by the BLM.

With the preparation of a SWPPP or equivalent, Dust Control Plan, topsoil management, and the implementation of BMPs, direct adverse effects from soil erosion caused by construction would be minimized.

Impacts to Sensitive Soils

Sensitive soils, including biological soil crust and desert pavement, are those soils that are most vulnerable to disturbance and are heavily impacted by the compression and shear forces generated by vehicle and equipment use (Chandler, et al. 2019, Zhao, et al. 2016). Cyanobacterial filaments, lichens, and mosses present in biological soil crust are brittle when dry and crush easily when subjected to even minor disturbance, including from minimal foot traffic and limited vehicle or equipment use. Desert pavement is slightly more resistant to crushing, but it is easily destroyed by heavy equipment use and earthwork, and even limited vehicle use has been shown to leave depressional tracks that persist for many decades (Belnap and Warren 2002). The vesicular soil horizons that develop below desert pavement are generally fragile, and disturbance may lead to a change in pore morphology, which has the potential to alter soil hydrology and surface stability (Yonovitz 2008). Grading, leveling, and disc and roll activities associated with the Proposed Action would completely remove these sensitive soil structures and result in permanent, adverse impacts to biological soil crust and desert pavement resources. The loss of desert pavement, biological soil crust, and vesicular horizons through disturbance and erosion would have long-lasting impacts on soil function (Caster, et al. 2021, Belnap, Phillips, et al. 2003, Williams, Buck and Beyene 2012).

In arid and semiarid regions, it has been estimated that biological soil crust can take several hundred to thousands of years to recover after loss from disturbance, especially if disturbance is ongoing. Total recovery of biological soil crust depends on the severity, type and duration of disturbance as well as the soil properties and climate conditions of the region, especially the precipitation amounts and frequencies (Zhao, et al. 2016). When disturbance is severe or frequent enough to remove crust material, recovery is slower than if organisms are crushed but left in place (Belnap, Biological soil crusts in deserts: a short review of their role in soil fertility, stabilization, and water relations 2003). Coarse soils show the slowest recovery rates, which is probably related to their inherent instability, low fertility, and low water-holding capacity. Because crust organisms are only metabolically active when wet, climatic regimes after disturbances are very important in determining recovery rates. Accordingly, regions with greater effective rainfall recover much more quickly than those with lower rainfall (Belnap, Biological soil crusts in deserts: a short review of their role in soil fertility, stabilization, and water relations 2003, Bowker, et al. 2018).

The magnitude of disturbance during construction is largely tied to the site preparation methods applied and the specific location of different soil types which would determine the actual level of impacts to biological soil crust and desert pavement. Grading and leveling would completely remove all biological soil crust and desert pavement, causing the greatest disturbance and potential loss of these resources. The removal of vegetation and use of heavy machinery, especially in areas of desert pavement, would accelerate erosion by wind and water. Therefore, loss of desert pavement, biological soil crust, and vesicular horizons through disturbance and erosion would have long-lasting impacts on soil function. SNDO-required PDFs BC-1 and BC-2 would require harvest and salvage of biocrusts and their eventual use for restoration of the site, reducing the effects to biocrusts. Implementation of SNDO-required PDFs SR-1, SR-2, SR-3, and SR-4 would ensure topsoil, including desert pavement, is properly salvaged and reused on-site where feasible and not mixed with subsoil. Implementation of the Site Restoration-Revegetation & Decommissioning-Reclamation Plan would include measures to restore topsoil during restoration and would reduce permanent impacts to sensitive soils.

Construction would also impact subsurface soils including the petrocalcic horizons where posts or other infrastructure is located below the surface. This would result in an increase in water intrusion into these subsoil horizons potentially causing increased breakdown of these horizons but would occur in much smaller, non-continuous areas where the infrastructure is belowground.

Impacts to Soil Productivity

Construction activities would affect soil productivity through temporary and permanent disturbance of the Project site. Temporary impacts to soil productivity would occur in areas that are compacted or crushed by construction equipment, vehicles, or foot traffic. Compaction has been shown to hinder reclamation and revegetation efforts. Soil compaction and earthwork activities would likely also decrease water infiltration and runoff, which may lead to changes in natural water flow paths.

In addition, mixing and/or removal of topsoil (associated with grading, leveling, and tilling) would result in a losses of important soil resources such as the native seedbank, fertile islands, soil nutrients, organic matter, and microbial communities (including biological soil crust) that support healthy vegetation communities. SNDO-required PDFs SR-1 through SR-4 would require topsoil salvage, which would allow for reuse on site after the life of the Project and reduce the loss of topsoil and soil resources in the long term.

Impacts to Paleontological Resources

Construction of the Proposed Action could have potential adverse impacts to paleontological resources should they occur undetected during ground-disturbance. Grading and other subsurface disturbance may result in adverse direct impacts if it resulted in the destruction of a paleontological resource through direct damage, such as crushing or removal. Indirect effects could result from increased access to paleontological resources by construction personnel when the Project is being built, which would 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.

Solar PEIS PDF P1-1 requires development and implementation training/education programs as well as planning for management and mitigation of paleontological resources. The PDF includes measures to prevent looting/vandalism and includes environmental inspection and monitoring and other relevant plans to monitor and respond to paleontological resources during construction, operation and maintenance, and decommissioning. Solar PEIS PDF P2-2 requires the Project developers notify the BLM immediately upon discovery of a fossil and halt work at the location until qualified personnel can determine the significance of the find and make site-specific recommendations and for collection or other resource protection. The PDF would minimize the potential for adverse effects on previously undiscovered paleontological resources during construction of the Proposed Action. With the implementation of the PDF, 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 PDF P1-1, which includes requirements for worker awareness training and procedures for treating unanticipated paleontological resources found on the Project site during construction.

Operation and Maintenance Impacts

Impacts to Soils

Vegetation management activities, including trimming vegetation within the arrays, would cause continued soil surface disruption. Because trimming vegetation would be by hand, the disruption would be minor compared to construction. Maintenance of access roads would prevent the deterioration of road conditions that lead to wind and water erosion. 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 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. 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.

Loss of soil productivity is associated with all long-term Project components needed for operation and maintenance of Project facilities throughout the 30-year lifespan of the Project. Areas such as energy storage systems, roads, the substation, and the gen-tie structure locations would not be reclaimed until the end-of-life of the Project. Reclamation would occur in accordance with the BLM-approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan. Although the site would be reclaimed, areas that supported physical structures, such as the on-site substation, may experience delayed recovery in soil productivity.

As discussed in Section 3.16, post-development surface flows would be similar to the pre-development flows. Flow depths and velocities within the Project site would also remain similar to pre-development conditions. PDFs would be required to ensure no downstream effects of erosion.

Dust palliatives may also be used during operation and maintenance, with BLM approval. The use of dust palliatives would be managed through the implementation of Solar PEIS PDF WR 3-1, which requires monitoring water quality in areas adjacent or downstream from the Project to ensure water quality is protected. Adverse effects would be minimized with implementation of the PDF.

Wind-driven erosion would occur across the bare soils in all solar development areas where soils are exposed, as detailed in Section 3.3: Air Quality and Greenhouse Gases/Climate Change. This would include the potential for substantial wind-driven erosion during initial operations, prior to vegetation regrowth, when the ground is assumed to be comparatively bare. During subsequent operation, as vegetation begins to recover and permanent disturbances (e.g., roads compact sufficiently to reduce fugitive dust), the uncontrolled fugitive dust would be similar to that of the current existing conditions.

Operation and maintenance of the Project would not involve substantial use of off-road equipment and vehicles as the operations workforce is estimated to be up to 10 workers and the facility would require minimal maintenance. Fugitive dust emissions would be significantly lower during operation and maintenance than during construction phase due to PDFs that would require on-site roads and parking lots to be paved and/or treated.

The Project would implement Solar PEIS PDF AQC1-3, which outlines compliance and monitoring requirements during operation and maintenance. PEIS PDF AQC1-3 stipulates that areas that have been graded, scraped, bladed, compacted, or denuded of vegetation must be monitored and treated. Compliance methods include reapplying palliatives or water as necessary for effective fugitive dust management and ensuring compliance of all combustion sources with state emission standards (e.g., best available control technology requirements). Impacts would not be adverse. See Section 3.3: Air Quality for more information regarding dust.

Impacts to Paleontological Resources

Direct effects on paleontological resources would not occur during operation and maintenance, as no new ground disturbance would occur. Indirect impacts on paleontological resources from theft or vandalism would not occur, due to the perimeter security fencing around the solar site. The Proposed Action would not provide new public access to areas with the potential to contain paleontological resources.

Decommissioning Impacts

Impacts to Soils

Decommissioning would include removal of all facility components within the Project sub-areas, linear facilities, and access roads. Disturbance areas would be similar to those for Project construction. Decommissioning equipment, techniques, and personnel would also be similar to the level and type of impacts described for the construction process. Because no new infrastructure would be built during decommissioning, no additional effects to subsurface or petrocalcic horizons would occur. The Project would implement Solar PEIS PDF AQC1-4, which states that reclamation of the site would incorporate the PDFs listed under Solar PEIS AQC1-3 to reduce the likelihood of air quality impacts from fugitive dust during decommissioning. The implementation of Solar PEIS PDF AQC1-4 would in turn reduce soil erosion and loss of topsoil. In accordance with Project plans, decommissioning would be conducted in accordance with PDFs discussed in Appendix B, including the Site Restoration-Revegetation & Decommissioning-Reclamation Plan. As discussed above, permanent soil productivity loss would occur where soils are completely covered by project structures and no longer available for production or where soils are removed for structural foundations.

Impacts to Paleontological Resources

Decommissioning activities would be similar to construction activities and would occur within previously disturbed areas and existing access roads. Restoration would occur in accordance with the Site Restoration-Revegetation & Decommissioning-Reclamation Plan, minimizing the potential for erosion. Direct and indirect impacts on 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.

Cumulative Impacts

Impacts to Soils

Impacts from cumulative projects could combine to produce substantial adverse effects that result in soil erosion, impacts to biological soil crust and desert pavement, loss of topsoil and soil productivity, and impacts to the underlying soil horizons. The Proposed Action would contribute to the cumulative effects on soils from approximately 1,301 acres of drive and crush methods of construction (D-2) and approximately 649 acres that are graded for Project construction and operation. The other solar projects and associated transmission lines, either proposed or already approved and under construction, would also contribute to impacts to soils, see Table 3.14-4 (based on Table 3.2-3 in Section 3.2) for total acreages of solar projects based on construction types. As noted in Table 3.14-3, impacts associated with D-1 disturbance level would be minimal and temporary, impacts associated with D-2 would involve compaction and vegetation removal and would be temporary, and impacts associated with D-3 disturbance level would involve topsoil removal and would be long-term.

Table 3.14-4 Cumulative Renewable Projects Approximate Disturbance Acreages

	D-0	D-1	D-2	D-3
Proposed Action	3,643	549	4,084	23,189
Alternative 1	4,204	5,280	6,017	15,915

Other cumulative foreseeable projects such as the proposed energy storage and transmission lines would also result in impacts to native habitat. Exposure of bare soil would increase erosion and sedimentation from wind and water. Cumulative impacts are limited to those that would disturb soils within 5 miles of the Project site as well as other projects located within soils similar to those of the Project site. All cumulative construction projects that disturb more than 1 acre of land would be required to comply with the Construction Stormwater General Permit, which requires preparation and implementation of an SWPPP or equivalent. Erosion control BMPs in the SWPPP or equivalent would minimize erosion. The cumulative impacts related to erosion would not be substantial.

While the amount of biological soil crust and desert pavement affected by cumulative projects is unknown, given the overall acreage of cumulative development, it is reasonable to assume a cumulative adverse effect to these resources. SNDO-required PDFs would reduce these effects by requiring biological soil crust be salvaged. While desert pavement cannot be salvaged, it would be treated as topsoil and managed such that when the topsoil is replaced, it would reduce soil erosion. Other cumulative projects could reduce potential impacts to desert pavement through implementation of the SNDO-required PDFs that outline the salvage and reuse of desert pavement on-site. The reuse of desert pavement as topsoil on-site would reduce permanent cumulative impacts to sensitive soils.

As noted in Table 3.14-4, over 31,465 acres of solar development could occur on the 435,655 acres of BLM lands in the Pahrump Valley. Under the Proposed Action, it is estimated that 23,189 acres of topsoil could be removed (Chapter 3.2). On BLM lands in Nevada, SNDO-required PDFs SR-1 through SR-4 would require topsoil salvage, which would reduce the effects to soil productivity, but it would still result in a cumulatively substantial adverse effect.

All cumulative solar projects would impact subsurface soils including the petrocalcic horizons where posts or other infrastructure is located below the surface, see Figure 3.14-1 in Appendix D. Additionally, transmission projects, such as the Southwest Nevada Reliability Improvement Project, Pahrump Valley Loop-in Project, and the Gridliance West Core Upgrades Transmission Project, would all impact subsurface soils when putting the transmission poles in place and could also impact sensitive soils. This would cumulatively result in an increase in water intrusion into these subsoil horizons potentially causing increased breakdown of these horizons. However, the cumulative effects to subsurface soils would occur in much smaller, non-continuous areas where the infrastructure is belowground and would not be anticipated to be cumulatively adverse.

Impacts to Paleontological Resources

Cumulative projects are located on similar geologic units as the Proposed Action, some of which are designated as having an unknown potential for containing paleontological resources. Other proposed projects would involve ground-disturbing activities in areas where paleontological resources may be found and could uncover and damage paleontological resources. These resources could be destroyed during construction or illegally collected by the public and would contribute to cumulative impacts due to the potential for loss of regional paleontological resources. Measures such as the Solar PEIS PDF or a Paleontological Resources Mitigation and Monitoring Plan would be required to avoid or minimize damage to paleontological resources and reduce cumulative impacts on paleontological resources.

3.14.6 Alternative 1 – Resource Integration Alternative

Construction and Operations and Maintenance Impacts

Grading and removal of vegetation can increase soil erosion and sedimentation as loose soils and sands are transported off site via stormwater runoff. Alternative 1 would be constructed primarily using construction methods that minimize disturbance to topography, soils, and vegetation (refer to Table 3.14-3). Specifically, the Resources Integration Alternative would implement overland travel which is expected to improve the retention of native vegetation, soil retention, seed banks, and biological soil crusts while minimizing fugitive dust.

Overland travel (926 acres) would be used in lieu of more intensive construction methods (D-2 and D-3) that would be implemented under the Proposed Action. The development area for D-2 would be reduced by 684 to 617 acres (approximately 52 percent reduction) compared to the Proposed Action. Grading activities under D-3 would be limited to 20 to 21.5 percent of the total development areas (an estimated 406 acres) in the solar field which represents a 243-acre (approximately 37 percent) reduction compared to the Proposed Action. Alternative 1 also sets a maximum disturbance of perennial vegetation of 40 percent within each solar array block.

Vegetation that is not subject to grading, crushing, or other disturbances would be trimmed but only if its height would interfere with solar panels or create a fire risk. With the reduction in areas to be permanently impacted through grading and a minimum threshold set for native perennial vegetation loss, this alternative would result in fewer impacts to surface soils. With the application of less intensive and disruptive construction methods, soil compaction would be reduced, and on-site vegetation would have a higher likelihood to survive and regrow after construction and during operations. Erosion and sedimentation would be reduced due to retention of vegetation although the effects of the areas constructed using D-2 and D3 techniques would be the same as for the Proposed Action and the same Solar PEIS PDFs and SNDO-required PDFs would be required. Similarly, loss of biocrust, desert pavement, and topsoil would also be reduced, but the areas constructed using D-2 and D3 techniques would be the same as for the Proposed Action and the same Solar PEIS PDFs and SNDO-required PDFs would be required. Alternative 1 would result in lesser impacts to soils compared with the Proposed Action.

Impacts to subsurface soils would remain the same as with the Proposed Action because the Alternative 1 would include the same subsurface infrastructure as the Proposed Action.

As Alternative 1 would result in less grading and soil removal than the Proposed Action, it would have less potential to unearth paleontological resources, resulting in a reduction in potential effects to fossils. However, for areas that do require clear and cut with soil removal, the potential effects to paleontological resources would be the same as with the Proposed Action. Measures such as the Solar PEIS PDF or a Paleontological Resources Mitigation and Monitoring Plan would be required to avoid or minimize damage to paleontological resources and reduce cumulative impacts on paleontological resources.

Decommissioning Impacts

Following completion of the Project, decommissioning and site restoration would likely be more successful due to less areas of permanent disturbance and erosion. The Resource Integration Alternative would reduce the overall adverse impacts to soil resources from the Project but would not eliminate them. All Solar PEIS PDF for mitigating negative impacts to soils from construction, operation and maintenance, and decommissioning of the Project would remain the same as the Proposed Action. While this alternative would result in substantially fewer impacts to soils, there would still be adverse impacts in areas subjected to grading and soil compaction (D-3) and soil disturbance in areas of drive and crush (D-2).

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects developed in the Nevada portion of the Pahrump Valley would incorporate similar techniques as those of the Resources Integration Alternative to reduce effects in the Pahrump Valley, see Table 3.14-4. As with the Proposed Action, impacts from the cumulative projects could combine to produce substantial adverse effects that result in soil erosion, impacts to biological soil crust and desert pavement would be 7,274 fewer acres of topsoil removal. For development using overland travel (D-1), soil compaction would be minimized and impacts to sensitive soils would be cumulatively reduced. Because the Alternative 1 would result in less compaction and soil removal than the Proposed Action (approximately 37 percent less construction using D-3 methods), it would have less potential to unearth paleontological resources, resulting in a reduction in potential effects to fossils. However, for areas that do require clear and cut with soil removal, the potential effects to paleontological resources would be the same as with the Proposed Action and the Solar PEIS PDFs would be required to reduce effects to fossils.

3.14.7 No Action Alternative

Under the No Action Alternative, the BLM would not issue ROW grants or special use permits, and the Project would not be constructed. Surface disturbance would not occur, and soils and paleontological resources would not be affected.

3.14.8 Project Design Features and Mitigation Measures

Project design features (PDFs) (in accordance with the Solar PEIS and the SNDO) are listed in Appendix B. The Project would comply with the following PDFs to minimize adverse impacts to soils:

Solar PEIS Programmatic Design Features

- PEIS SR-2-1: Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.
- PEIS WR3-1: Compliance with the terms and conditions for water resource mitigation shall be monitored by the project developer. The developer shall consult with the BLM through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- PEIS P1-1: Project developers shall coordinate with the BLM early in the project planning process to identify and minimize impacts on paleontological resources.
- PEIS P2-2: Project developers shall notify the BLM immediately upon discovery of fossils.
- PEIS AQC1-3: Compliance with the terms and conditions for air quality shall be monitored by the project developer. Consultation with BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- PEIS AQC1-4: Reclamation of the site shall incorporate the design features listed above for construction under AQC2-1 to reduce the likelihood of air quality impacts associated decommissioning.

Southern Nevada District Office Project Design Features

- Hyd-3: Provides silt fence requirements.
- Hyd-4: Provides silt fence construction requirements.
- Hyd-5: Requires minimizing erosion.
- Hyd-9: Requires erosion minimization.
- SR-1: Requires removal and protection of topsoil.
- SR-2: Provides requirements for topsoil stockpiled for longer than one year.
- SR-3: Requires staking to clearly identify limits of construction.
- SR-4: Specifies topsoil contouring requirements.
- Air-1: Requires watering to minimize wind erosion.
- BC-1: Requires avoidance of biological soil crusts where feasible.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Dust Control and Air Quality Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- Technical Drainage Plan
- Stormwater Pollution Prevention Plan or equivalent
- Grading Plan
- Paleontological Resources Mitigation and Monitoring Plan

3.14.9 Irreversible and Irretrievable Impacts

Soil impacts associated with the Proposed Action are related to long-term loss of productivity and loss of sensitive soil types such as biocrusts and desert pavement. Decommissioning would be conducted in accordance with the BLM approved Site Restoration-Revegetation & Decommissioning-Reclamation Plan. Soil compaction could decrease water infiltration and runoff, leading to a redistribution of soil moisture and vegetation productivity response within the immediate landscape. Desert pavement cannot be salvaged, so the Project would result in a long-term loss of desert pavement. However, as mentioned above, desert pavement would be salvaged along with the topsoil and when returned to the site, would have the materials that could eventually reform a desert pavement over time.

Irreversible and irretrievable impacts to paleontological resources are not anticipated. Because best management practices required under the Solar PEIS, include training and methods to avoid looting and vandalism, as well as treatment for unanticipated paleontological finds, any unanticipated fossils found during ground disturbance would be curated and could result to a benefit to the study of paleontology.

3.15 Transportation and Traffic

3.15.1 Introduction

This section describes the existing transportation and traffic conditions in the analysis area. This analysis is limited to non-recreation transportation routes that would be used for the transportation of materials and equipment and as commuter routes during construction, operation and maintenance, and decommissioning of the Project and alternatives. An analysis of Project impacts on recreation access routes is provided in Section 3.10: Recreation. Analysis in this section is primarily based on the *Traffic Impact Analysis*, prepared by Westwood Professional Services (Westwood 2023) and *Cumulative Traffic Technical Memorandum* prepared by Kittelson & Associates (Kittelson & Associates, 2023). Regulations that apply to the Project are included in Appendix C.

3.15.2 Analysis Area

The analysis area for transportation and traffic is a 5-mile radius around the Project area and focuses on the primary public-access transportation routes that would be used by the Project. These include State Route (SR) 160, Trout Canyon Road, and Tecopa Road (see Figure 2-1). Hafen Ranch Road, Indian Reservation Road, Manse Road, Caas Road, and E. Gamebird Road are also within the 5-mile radius around the Project site; however, these roads are not anticipated to be used as transportation routes for the Project. While materials, equipment, and commuter trips may originate outside of the 5-mile analysis area, Project-related traffic on busier transportation corridors, such as Interstate 15 (I-15) or roads within the Las Vegas metropolitan area, would experience no notable impact to transportation and are therefore not discussed in detail in this section.

All traffic traveling to and from the Project site is expected to use SR 160 because it provides both regional and direct access. The Project driveway is between Trout Canyon Road and Tecopa Road, off SR 160. Traffic arriving from Pahrump would use southbound SR 160 and make a right turn into the Project driveway while traffic arriving from the Las Vegas metropolitan area would use northbound SR 160 and make a left into the Project driveway. Exiting traffic would either make a right onto southbound SR 160 or make a left and cross the opposing lane into northbound SR 160.

3.15.3 Affected Environment

Regional and Local Roadway Facilities

SR 160 is the primary transportation route between the Pahrump Valley and the Las Vegas metropolitan area. SR 160 is located directly adjacent to the Project site and would provide direct access to the Project site. In the analysis area, SR 160 is a generally flat, paved, four-lane, rural divided highway with a speed limit of 70 miles per hour (mph). Internal access roads would be constructed and would provide circulation around the solar arrays and inverters and access to on-site facilities for operation and maintenance.

Several other small private roadways are located within the analysis area, such as Hafen Ranch Road, Indian Reservation Road, Manse Road, Caas Road, and E. Gamebird Road. These roadways are within Pahrump and are not expected to be used as transportation routes during construction; however, construction workers from the Pahrump area may use these roads to travel to SR 160 for access to the Project site. Traffic counts on these three local roads are unknown but are anticipated to be much less than those for SR 160 due to the rural setting and limited-service areas.

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 SR 160 in the Project area operated at a LOS D or better.

The Nevada Department of Transportation (NDOT) estimates that the average annual daily traffic count for SR 160 is approximately 9,100 (Nevada Department of Transportation 2017). Twenty-four-hour classification *average daily traffic* (ADT) counts were taken on November 2, 2021, along SR 160 between Trout Canyon Road and Tecopa Road. Peak hour morning and evening traffic volumes were derived from the 24-hour ADT count at the Project driveway. The morning peak hour selected was 9:00 a.m., and the evening peak hour selected was 4:45 p.m. The evening peak hour had the greatest total flows. ADT volumes for SR 160 were determined to be approximately 11,395 total ADT (10,934 passenger vehicles, 277 light trucks, and 184 heavy trucks). See Appendix A of the *Traffic Impact Analysis* for more information.

Traffic Hazards

Vehicular accident data were requested from the NDOT Safety Engineering Division for the most recent 3-year reporting period for the segment of SR 160 between Trout Canyon Road and Tecopa Road. A total of 17 crashes were recorded along this segment of SR 160 between 2018 and 2021. Of those 17 crashes, 8 crashes (47%) were property-damage-only crashes, 7 crashes (41%) were crashes accounting for injuries to 10 people, and 2 crashes (12%) were crashes accounting for 2 fatalities (Westwood 2023).

3.15.4 Environmental Consequences

Methodology

The Project would add traffic to SR 160. Roadway facilities were evaluated according to their theoretical capacity, as outlined in the *Highway Capacity Manual, 6th Edition* (Westwood, 2023). The Project site is located outside of the town of Pahrump, and typical commute-period peaking is not observed in the area. 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 or in the vicinity.

To conduct the transportation and traffic analysis, Project-related traffic was compared with existing traffic LOS in the analysis area to determine whether a change in the capacity of the existing transportation system would occur as a result of construction, operation and maintenance, and decommissioning of the Project.

NDOT Access Management Standards

As the Project includes one new driveway connection onto SR 160, it must comply with NDOT's 2017 Access Management System and Standards (NDOT AMSS) which outlines the requirements for new access connections to NDOT roadways. SR 160 is classified as Roadway Class 3: Other Principal Arterial with two lanes of travel in both directions and a 70-mph posted speed limit in the vicinity of the project site. The analysis considers whether the Project meets the NDOT AMSS requirements.

Access Spacing

NDOT AMSS outlines access spacing standards by roadway class and access type. A minimum spacing of 2,640 feet is require along a Class 3 arterial posted at 70 mph between an unsignalized full access driveway, such as is proposed for the Project, and another unsignalized full access driveway, such as would be the case with the access to Mabes Street and to Tecopa Road. The space between the proposed Rough Hat Clark driveway intersection and the existing Mabes Street access would be 22,885 feet. The space between the proposed Project access driveway and the access to Tecopa Road would be 14,145 feet. The Project satisfies the AMSS standard spacing requirement.

Decision and Stopping Sight Distances

NDOT AMSS provides the decision and stopping sight distances for various design speeds. Based on a 75-mph design speed (5 mph over the posted speed limit of 70 mph), the decision and stopping sight distances for a rural condition with low level grades would be 1,180 feet and 820 feet, respectively.

Turn Lane Warrants

NDOT AMSS provides the left-turn and right-turn lane warrants at an unsignalized intersection for multilane roadways in a rural area. A left turn lane is required for left turn movements with volumes greater than 26 vehicles per hour at speeds greater than 60 mph. A right turn lane is required for right turn movements with volumes greater than 31 vehicles per hour at speeds greater than 60 mph.

Deceleration Lane Lengths

NDOT AMSS provides the minimum length of a deceleration lane (turn lane) that is equal to the sum of the queue storage length and the deceleration length. NDOT AMSS specifies that a single turn lane for a bay taper is to be 50 feet in length. NDOT AMSS specifies a deceleration length of 820 ft for a road with a 70-mph posted speed limit. NDOT AMSS specifies 70:1 approach and departure tapers for a road with a 70-mph posted speed limit.

3.15.5 Proposed Action

Construction Impacts

Roadway Operations

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, which may be as high as 50 to 70 trucks per day during peak construction. Truck trips include, but are not limited to, delivery trucks, dump trucks, water trucks, waste-hauling trucks, concrete trucks, and portable toilet trucks. Daily vehicle traffic would be primarily composed of workers' passenger cars/light trucks and worker shuttles. The highest number of trips would be from construction workers traveling to and from the site each day. The Project would also truck construction water to the Project site, which would increase the number of trucks accessing the Project site by up to 40 per day (4 peak-hour trips), assuming the use of 4,000-gallon water trucks and an 18-month construction schedule. Total truck trips are anticipated to be up to 110 trucks per day (70 delivery truck trips and 40 water delivery truck trips). It should be noted that heavy vehicle trips for construction materials and large equipment are anticipated to be off-peak hours to ensure smooth traffic operations during high worker vehicle activity.

At peak construction, the Proposed Action is expected to employ up to 555 construction workers per day. Most of the commuter traffic is expected to use SR 160 to access the site. The town of Pahrump (approximate population 40,000) is located 12 miles to the north of the site and has an anticipated travel time to the Project site of approximately 10 minutes. Las Vegas (approximate population of 660,000) is located 40 miles to the south and has an anticipated travel time to the site of around 50 minutes. It is assumed that most of the workers would commute from the Las Vegas metropolitan area, and vehicle occupancy was conservatively analyzed as 1 worker per vehicle (555 vehicles during the AM peak hour and 555 vehicles during the PM peak hour). Analysis in the *Traffic Impact Analysis* assumed that 60 percent (approximately 333 vehicles per AM or PM peak hour) of the commuter traffic generated by the Proposed Action would travel along SR 160 to and from the Las Vegas metropolitan area. The remaining 40 percent (approximately 222 vehicles per AM or PM peak hour) of the commuter traffic would travel along SR 160 to and from the Pahrump Valley. The overall trip distribution for the Proposed Action is provided in Figure 2 of the *Traffic Impact Analysis* (Westwood 2023).

During construction, trips per day from the Proposed Action would account for an average of 1,220 vehicle counts on SR 160 (110 truck trips, 555 vehicle AM peak hour trips, and 555 vehicle PM peak hour trips) which equates to a 13 percent increase from the NDOT average daily traffic count of 9,100. The increase in traffic would be most noticeable in the Project vicinity along SR 160, where construction traffic would be entering and exiting SR 160. Construction would generally occur between 7 a.m. and 7 p.m., Monday through Friday. It should be noted that the peak arrival and departure times for construction workers is expected to be 5:30 am and 3:00 pm, respectively, which does not coincide with the AM and PM peak hour times on SR-160 (9:00 am and 4:45 pm respectively). During the Project start-up phase, some low intensity non-ground disturbing activities (such as equipment and system testing) may continue 24 hours per day, 7 days per week during the 18-month construction period.

Construction traffic was analyzed at the proposed driveway that intersects with SR 160. The intersection was analyzed using the lowest level of traffic control that provided an acceptable intersection LOS. Existing traffic on SR 160 in the Project area operated at a LOS better than D. With the Project, LOS would continue to operate better than D except for the left turn lane exiting the Project driveway. Results of the analysis for the study intersection for the Proposed Action are summarized on Table 3.15-1 and Table 5 of the *Traffic Impact Analysis* (Westwood 2023).

Table 3.15-1 Level of Service Analysis with Project

Traffic Maneuver	AM Peak Hour					PM Peak Hour				
	LOS	Delay[1]	Synchro Queue[2]	V/C[3]	Bay Length[4]	LOS	Delay	Synchro Queue	V/C	Bay Length
Overall	A	3.30	-	-	-	A	7.50	-	-	-
Northbound Left (NBL)	B	11.60	48 ft	0.400	1-875 ft	A	8.10	0 ft	0.005	1-875 ft
Northbound Turn (NBL)	A	0.00	-	0.007	-	A	0.00	-	0.000	-

Traffic Maneuver	AM Peak Hour					PM Peak Hour				
	LOS	Delay[1]	Synchro Queue[2]	V/C[3]	Bay Length[4]	LOS	Delay	Synchro Queue	V/C	Bay Length
Southbound Right (SBR)	A	0.00	-	0.000	1-875 ft	A	0.00	-	0.000	1-875 ft
Southbound Turn (SBT)	A	0.00	-	0.000	-	A	0.00	-	0.000	-
Eastbound Left existing Project (EBL)	**E**	48.60	5 ft	0.062	-	**D**	32.10	113 ft	0.661	-
Eastbound Right existing Project (EBR)	A	9.60	-	0.007	-	B	12.70	-	0.438	-

1. Delay – Average Seconds of Delay per vehicle
2. Synchro Queue – Synchro Software Estimated Queue
3. V/C – Volume to Capacity Ratio
4. LT Bay Length – Number of Defined Left Turn Lanes and Storage Length

The eastbound left turn movement exiting the Project performs at LOS E during the AM peak hour and LOS D during the PM peak hour. The overall LOS of the study intersection is A for both the AM and PM peak hour because the majority of the traffic that travels through the intersection in the northbound and southbound through directions would not stop at the intersection. It should be noted that the peak arrival and departure time for construction workers (5:30 am and 3:00 pm, respectively) does not coincide with the peak-hour times on SR 160 (9:00 am and 4:45 pm, respectively). Nonetheless, the traffic volumes were combined for conservative analysis of traffic conditions. Summary reports from the LOS analyses are provided in the *Traffic Impact Analysis* (Westwood 2023).

Local traffic on Trout Canyon Road and Tecopa Road as well as nearby rural roads may experience intermittent delays due to construction traffic on SR 160 during the construction period. Temporary impacts from increased construction traffic on Trout Canyon Road and Tecopa Road are not expected as the construction traffic would be on SR 160.

The Proposed Action would implement APM Transport-1, which includes traffic control measures to reduce hazards for incoming and outgoing traffic from the Project site to the extent practicable. Project design features would be approved by the BLM and NDOT. APM Transport-1 states that the Project would implement appropriate traffic control measures to reduce hazards for incoming and outgoing traffic and streamline traffic flow, such as speed limit reductions; installing signage; and adding acceleration, deceleration, and turn lanes on routes with site entrances. The ground disturbance associated with the acceleration and deceleration turn lanes is assumed in the overall Project ground disturbance. AMP Transport-1 would be consistent with the Solar PEIS PDF T2-1, which also requires project developers to incorporate measures to streamline traffic control, including turn lanes as needed. The *Traffic Impact Analysis* identified a southbound right turn lane and a northbound left turn lane as recommendations to meet NDOT's 2017 Access Management System and Standards. These recommendations would be reviewed, and any subsequent requirements would be approved by NDOT.

Traffic Hazards

The Project would generate a significant number of workers and delivery vehicle trips (up to 110 truck trips, 555 vehicle AM peak hour trips, and 555 vehicle PM peak hour 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 SR 160. Compliance with NDOT standards and construction of road improvements would reduce potential traffic hazards.

The space between the proposed Project driveway along the SR 160 frontage road and the existing intersections comply with the NDOT AMSS. The northbound left turn at the Project driveway has an estimated full buildout volume of 333 vehicles in the AM peak hour with an estimated 304 vehicles per hour estimate through volume. The southbound right turn at the Project driveway has an estimated full buildout volume of 222 vehicles in the AM peak hour with an estimated through volume of 407 vehicles per hour. Because of the level of vehicle traffic, turn lanes are warranted. The Proposed Action proposes a southbound right turn lane of 875 feet (50 feet storage length and 820 feet deceleration length) and a northbound left turn lane of 875 feet (50 feet storage length and 820 feet deceleration length). With the right and left turn lanes, the northbound left turn movement and southbound right turn movement would comply with NDOT AMSS standards reducing potential traffic hazards. NDOT would review and approve any planned improvements along SR 160 prior to construction. The traffic improvements would occur at the time of construction and would be completed by Project personnel.

In addition to right and left turn lanes on SR 160, a Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan are required as part of the BLM ROW Grant, which would specify traffic control measures, such as flaggers, escort vehicles, and signage to minimize conflicts and hazards. Project design features would be approved by the BLM and NDOT. Implementation of the Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan would reduce potential impacts associated with construction activities.

NDOT's 2017 Access Management System and Standards (NDOT AMSS) document outlines the requirements for new access connections to NDOT roadways. The Project includes a new driveway connection onto SR 160. This driveway would be classified as a *major commercial connection* based on the estimated daily trip generation and use type. The construction of the driveway would be coordinated and approved with NDOT to meet the Access Management System and Standards requirements.

Although full closure of SR 160 is not anticipated, installation of the driveway and the auxiliary power/telecommunications line SR 160 crossing could require short-term intermittent lane closures of SR 160 over a 6-month period. Intermittent closures of SR 160 would be coordinated with the NDOT. The necessary encroachment permits and authorizations would be obtained prior to any work within the SR 160 ROW. Adverse effects would not occur with proper coordination and implementation of the requirements of the encroachment permits. The Project has the potential to also result in damage to public roadways that could cause a hazard to other roadway users. However, SR 160 is a high-volume roadway designed to accommodate large trucks, therefore no damage is anticipated to occur.

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 implementation of a Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan; 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 Impacts

The Proposed Action would be staffed by up to 10 full-time employees during normal daytime working hours. This workforce would include administrative and management personnel, operators, and security and maintenance personnel. Operations personnel would work a single daytime shift, Monday through Friday, and would access the site via SR 160. The vehicle trips associated with the up-to-10 operations personnel would be negligible (less than .01 percent increase in traffic on SR 160) and would not impact transportation or traffic in the analysis area.

The solar facility would undergo quarterly maintenance inspections for the first year and thereafter annually. Operation and maintenance activities 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. Operation and maintenance of the Project would generate substantially fewer trips (98 percent less) than construction. Effects on traffic operations or emergency services would be less than during construction.

Decommissioning Impacts

Impacts to transportation and traffic during decommissioning would be similar to those described above for construction because similar vehicle trips would be required to decommission the facility. The Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan requires incorporation of specific information and measures such as implementing traffic control measures to reduce hazards for incoming and outgoing traffic and streamline traffic flow, such as intersection realignment and speed limit reductions; installing traffic lights and/or other signage; and adding acceleration, deceleration, and turn lanes on routes with site entrances. Implementation of the Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan would minimize the effects.

Cumulative Impacts

Construction of two nearby cumulative projects, the Copper Rays Solar Project and Golden Currant Solar Project, could overlap with the construction of the Project. Analysis in the *Cumulative Traffic Technical Memorandum* assesses the traffic operations at the intersection of SR 160 and Tecopa Road based on the overlapping construction of the three cumulative projects (Kittelson & Associates, 2023). The analysis studies Tecopa Road because it is the intersection where traffic from all three projects would overlap and because it is a road used by the public. Traffic from the Copper Rays Solar Project and the Proposed Action would overlap at the intersection of SR 160 and the Project site entrance but any delays at this intersection would be to the Project's construction workers only. Traffic from the Golden Currant Solar Project and the Proposed Action would overlap at the intersection of SR 160 and Tecopa Road. Table 3.15-2 presents trip generation estimates for the weekday AM and weekday PM peak hours for the cumulative projects.

Table 3.15-2 Trip Generation Estimates

Project	AM Peak Hour Trips			PM Peak Hour Trips		
	In	Out	Total	In	Out	Total
Proposed Action	555	0	555	0	555	555
Copper Rays	307	23	330	30	300	330
Golden Currant	275	0	275	275	0	275

Source: (Kittelson & Associates, 2023)

The analysis assesses the operations of the SR 160 and Tecopa Road intersection with the assumption that all three projects would be under construction by 2025. The analysis is based on LOS, which determines the weighted average stop delay in seconds per passenger car at an intersection. As noted above, LOS is designated "A" through "F" from best to worst, which covers the entire range of traffic operations that might occur. Intersection operations at SR 160 and Tecopa Road for Background 2025 conditions (no projects) and Cumulative 2025 conditions (plus projects) are shown in Table 3.15-3. As shown in the table, the addition of three cumulative project trips significantly degrades the intersection for vehicles approaching SR 160 on Tecopa Road during the PM peak hour as the northbound movements on Tecopa Road would operate at LOS F compared to LOS B under the background or no project scenario. Vehicles attempting the northbound movement would experience over 141 seconds of delay and the turning queue may extend over 18 vehicle lengths (approximately 450 feet). All other movements are expected to operate acceptably under cumulative conditions.

Table 3.15-3 Background and Cumulative Peak Hour Intersection Conditions

Intersection	Peak Hour	Background 2025 Conditions (delay in seconds)		Cumulative 2025 Conditions	
		WBL[1] (LOS)	NBL/R[2] (LOS)	WBL[1] (LOS)	NBL/R[2] (LOS)
SR 160 & Tecopa Road	AM	9.8 (A)	12.0 (B)	11.0 (B)	19.5 (C)
	PM	8.3 (A)	12.7 (B)	11.0 (B)	**141.1 (F)**

1. WBL = west bound left
2. NBL/R = north bound left/right

Source: (Kittelson & Associates, 2023)

Based on the anticipated operations of LOS F at the intersection of SR 160 and Tecopa Road, mitigation is required to reduce potential cumulative traffic impacts during construction should the construction schedules overlap. MM TRAF-1 includes recommendations to improve operations for vehicles approaching SR 160 from Tecopa Road during the PM peak hour. The recommended improvements would improve operations at the intersections during construction of the three solar projects by adding capacity to the right-turn movement by allowing for one channelized right-turn lane and adding pavement to accommodate trucks making the right-turn from Tecopa Road onto SR 160. There is an existing acceleration lane on SR 160 for vehicles turning right/eastbound from Tecopa Road onto SR 160 which would not need any improvements for the cumulative projects. No improvements to SR 160 are proposed to address the cumulative condition. Table 3.15-4 provides the operations of the intersection with the recommended improvements. As shown in Table 3.15-4 delay for right-turning vehicles is essentially eliminated. Vehicles making the northbound left-turn movement would experience approximately 46 seconds of delay during the AM peak hour (LOS E) and 31 seconds of delay during the PM peak hour (LOS D). Furthermore, LOS E would also be experienced by 8 vehicles during the AM peak hour, and this movement is expected to operate with a volume to capacity ratio of 0.1.

Table 3.15-4 Cumulative Peak Hour Intersection Operations - With Mitigation

Intersection	Peak Hour	Background 2025 Conditions		Cumulative 2025 Conditions	
		WBL	NBL/R	WBL	NBL/R
SR 160 & Tecopa Road	AM	11.0 (B)	45.7 (E)	0 (A)	11.0 (B)
	PM	11.0 (B)	31.1 (D)	0 (A)	11.0 (B)

Source: (Kittelson & Associates, 2023)

In addition to the mitigation measure, the Solar PEIS PDF TR-1 includes monitoring and responding to transportation during construction including adaptive management protocols, which would include measures such as staggering construction vehicle arrival times if the LOS of SR 160 were impacted during peak construction times. Additionally, each cumulative project would require a Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan that would ensure appropriate measures to reduce effects to roadway operations, traffic hazards, and emergency service. For these reasons, cumulative effects to traffic would not be cumulatively adverse. With the implementation of MM TRAF-1 and Solar PEIS PDF TR-1, cumulative adverse effects to LOS on SR 160 are not anticipated.

3.15.6 Alternative 1 – Resources Integration Alternative

Construction, Operations and Maintenance, and Decommissioning Impacts

Under Alternative 1, Project construction, operation and maintenance, and decommissioning effects related to traffic and transportation, including roadway operations, traffic hazards, and emergency services at the Project site, would remain the same as the Proposed Action because Alternative 1 would use the same types of construction vehicles, number of construction workers, and the same exit off SR 160. A Traffic and Transportation Plan, Signage and Flagging Plan, and Site Access Plan would be required for Alternative 1. Therefore, impacts to transportation and traffic would be the same.

Cumulative Impacts

The cumulative effects of the alternative combined with the build-out of the Pahrump Valley with solar development following resources integration methodologies would be the same as the cumulative analysis of the Proposed Action because the Projects' vehicle and truck trip requirements would be anticipated to be the same as with the Proposed Action.

3.15.7 No Action Alternative

Under the No Action Alternative, the Project would not be developed. Therefore, there would be no impacts to transportation and traffic in the analysis area.

3.15.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are summarized in Appendix B, the APM is included in the POD. The Project would comply with the following Solar PEIS PDFs and APM to minimize adverse impacts to transportation and traffic:

Solar PEIS Programmatic Design Features

- PDF T2-1: Project developers shall coordinate with the BLM and other federal, state, and local agencies to identify and minimize impacts on transportation.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Traffic and Transportation Plan
- Signage and Flagging Plan
- Site Access Plan
- MM TRAF-1: If construction schedules for Rough Hat Clark, Copper Rays, and/or Golden Currant solar projects overlap, the Applicant would continue to coordinate with NDOT and Clark County to fund any potential necessary improvements to the SR 160 and Tecopa Road intersection. These potential improvements may include:
  - Restriping the northbound approach on Tecopa Road to include two lanes – one left-turn lane and one channelized right-turn lane
  - Adding pavement to accommodate trucks making the right-turn from Tecopa Road onto SR 160
  - Installing raised/striped median to channelize vehicles in the eastbound and northbound right-turn lanes on Tecopa Road
  - Maintaining stop control (stop sign) for the northbound left turn lane on Tecopa Road
  - Other necessary improvements that are determined through coordination with NDOT

Applicant Proposed Measure

- APM Transport-1: The Project shall implement appropriate traffic control measures to reduce hazards for incoming and outgoing traffic and streamline traffic flow, such as speed limit reductions; installing signage; and adding acceleration, deceleration, and turn lanes on routes with site entrances.

3.15.9 Irreversible or Irretrievable Impacts

There are no irreversible or irretrievable impacts to transportation or traffic.

3.16 Vegetation, Special Status Plants, and Noxious Weeds

3.16.1 Introduction

The following sections describe the existing native vegetation communities, protected special status plant species (including cacti and yucca), and invasive and noxious weeds that are present within the Project site. Existing conditions are determined based on a combination of GIS desktop analysis, field data collected during surveys, and consultation with the BLM Las Vegas Field Office.

Field surveys were conducted in 2021 and 2022 to assess general vegetation characteristics, special status species presence/absence, cacti and yucca density estimates, desert pavement and biological soil crust cover, and invasive plant populations. At the time of the surveys, the area had been experiencing exceptional drought conditions and was drier than normal, precluding most annual plant growth. However, there was no anticipated habitat for any BLM sensitive species within the Project site. The BLM Assessment, Inventory, and Monitoring (AIM) Strategy field methods were used to assess vegetation cover, height, density, species richness, and species diversity. The methods and detailed results of these studies are documented in the Rough Hat Clark Solar Project Integrated Vegetation Survey Report (Heritage Environmental Consultants, LLC 2022). Desert pavement and biocrust resources are addressed in Section 3.12 Soils.

Several regulations and laws apply to management of vegetation resources in the Project area, including the federal Endangered Species Act (ESA), BLM Manual 6840 – *Sensitive Species Management*, 43 CFR Subpart 5400, Instruction Memorandum No. NV-2019-036, Nevada Administrative Code (NAC) chapter 527 – Protection and Preservation of Timbered Lands, Trees and Flora, and Executive Order 13112 Invasive Species. Other regulations and laws pertaining to native vegetation, special status plant species, and invasive species are described in Appendix C.

3.16.2 Analysis Area

The analysis area includes the entire 2,469-acre Project ROW and a 1-mile buffer around all proposed facilities, including the gen-tie line. This is the area in which direct and indirect effects on vegetation could occur. The Project area, including a 200-meter buffer around all areas proposed for disturbance, was surveyed for botanical resources. Some areas within the 200-meter buffer (specifically, the west side of the Project area) were not included due to overlap with adjacent solar projects that were already surveyed as part of the biological studies for those projects. A total of 2,967 acres were surveyed for botanical resources.

Impacts resulting from construction, operation and maintenance, and decommissioning activities occurring within the Project area have the potential to affect resources outside the Project area. For direct and indirect effects, the analysis area was buffered by 1 mile to account for sensitive resources that have the potential to occur in proximity to the Project area. For cumulative effects, the analysis area includes projects in the Pahrump Valley and adjacent contiguous areas. Other projects or management actions within the Pahrump Valley would be expected to affect similar vegetation communities and habitats.

3.16.3 Affected Environment

The Project is situated along the lower alluvial fans of the west side of the Spring Mountains in the Pahrump Valley. It is located within the Mojave Basin and Range ecoregion, which consists of broad basins and scattered mountains that tend to be lower-elevation and warmer than the Central Basin and Range ecoregion to the north (Bryce, et al. 2003). The town of Pahrump is north of the Project area, and the Stump Springs Regional Augmentation Site, which was developed for regional desert tortoise translocation, is a protected area south of Tecopa Road and the Project site. On the other side of the state boundary in California, to the west of the Project site, there are several small communities that are adjacent to larger wilderness areas within the California portion of the Mojave Desert.

3.16.3.1 Vegetation Communities

Native vegetation communities found in the Project area are characteristic of lower to mid elevations throughout the Mojave Desert region and include shrublands associated with arid valley floors and alluvial slopes, commonly characterized by species such creosote bush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and saltbush (*Atriplex* spp.). Vegetation is relatively homogenous throughout the Project area. Vegetation communities within the Project area include primarily Sonora-Mojave Creosote Bush – White Bursage Desert Scrub and Mojave Mid-elevation Mixed Desert Scrub, with very small areas of Intermountain Basins Semi-Desert Shrub Steppe in the southwest corner of the Project site and along SR 160. The rest of the land cover is disturbed/developed along SR 160. Figure 3.16-1 in Appendix D shows the distribution of vegetation communities within the Project area. Table 3.16-1 provides the acreage of each of the vegetation communities within the analysis area. A complete list of all plants observed during the botanical surveys is included in Appendix B of the Rough Hat Clark Solar Project Integrated Vegetation Survey Report (Heritage Environmental Consultants, LLC 2022).

Table 3.16-1 Vegetation Communities with the Analysis Area

Vegetation community	Acres/percent of analysis area
Sonora-Mojave Creosote Bush – White Bursage Desert Scrub	1,884/64%
Mojave Mid-Elevation Mixed Desert Scrub	1,038/35%
Intermountain Basins Semi-Desert Shrub Steppe	4/0.1%
Developed	36/1%
Total	2,962/100%

Source: (Heritage Environmental Consultants, LLC 2022)

Sonora-Mojave Creosote Bush – White Bursage Desert Scrub

Sonora-Mojave Creosote Bush – White Bursage Desert Scrub **(**creosote-bursage scrub) is the most abundant vegetation community in the region and within the Project area. It occurs on well-drained sandy flats in broad valleys, alluvial fans, lower bajadas, plains, and low hills in the Mojave and lower Sonoran deserts. This desert scrub is characterized by an open, xeromorphic shrub layer typically dominated by creosote bush and white bursage although a variety of shrub, dwarf-shrub, cacti, and herbaceous species may also be present, often as a sparse understory. Substrates are typically well-drained, sandy soils derived from colluvium or alluvium, and are often calcareous with a caliche hardpan and/or a pavement surface. In southern Nevada, common species include fourwing saltbush (*Atriplex canescens*), shadscale (*Atriplex confertifolia*), allscale (*Atriplex polycarpa*), Nevada ephedra (*Ephedra nevadensis*), Anderson's wolfberry (*Lycium andersonii*), brittlebush (*Encelia farinosa*), and beavertail cactus (*Opuntia basilaris*). The herbaceous layer is typically sparse but can be abundant within ephemeral washes after spring rains. Herbaceous species common in the region include phacelia (*Phacelia* spp.), desert trumpet (*Erigonium inflatum*), cryptantha (*Cryptantha* spp.), and low woollygrass (*Dasyochloa pulchella*) (Peterson 2008).

Mojave Mid-elevation Mixed Desert Scrub

This community represents the extensive desert scrub in the transition zone above creosote-bursage scrub and below the lower montane woodlands that occur in the eastern and central Mojave Desert. It is also common on lower piedmont slopes in the transition zone into the southern Great Basin. The vegetation in this ecological system is quite variable and generally consists of shrubs such as blackbrush (*Coleogyne ramosissima*), desert buckwheat (*Eriogonum fasciculatum var. polifolium*), spiny menodora (*Menodora spinescens*), diamond cholla (*Cylindropuntia ramosissima*), Joshua tree (*Yucca brevifolia*), and Mojave yucca (*Yucca schidigera*). A variety of grasses may be found and could include Indian ricegrass (*Achnatherum hymenoides*), and galleta (*Pleuraphis* spp.) (NatureServe 2022, Peterson 2008).

Intermountain Basins Semi-Desert Shrub Steppe

Semi-desert shrub steppe occurs throughout the intermountain western United States, typically at lower elevations on alluvial fans and flats with moderate to deep soils. This ecological system is typically dominated by grasses (>25 percent cover) with an open shrub layer. Disturbance may be important in maintaining the woody component. Native grass species often include Indian ricegrass, desert needlegrass (*Stipa speciosa*), galleta, and fluffgrass (*Dasyochloa pulchella*). =The shrub layer often includes fourwing saltbush, white rubber rabbitbrush (*Ericameria nauseosa var hololeuca*), Mojave rabbitbrush (*Ericameria paniculata*), snakeweed (*Gutierrezia sarothrae*), and winterfat (*Krascheninnikovia lanata*) (NatureServe 2022, Peterson 2008). Annual grasses, especially the exotics red brome (*Bromus rubens*), Mediterranean grass (*Schismus barbatus*), and cheatgrass (*Bromus tectorum*), may be present to abundant.

3.16.3.2 Special Status Plants

Special status plants include state or federally listed threatened, endangered, proposed, or candidate species, BLM sensitive species, species protected under the Nevada Administrative Code (NAC) chapter 527, and other at-risk taxa tracked by the Nevada Division of Natural History (NDNH) under the Nevada Natural Heritage Program (NNHP). BLM sensitive species are those that either have experienced a downward trend (or are predicted to) such that viability of the species is at risk, or where the viability of the species is at risk because the species depends on ecological refugia or specialized or unique habitats on BLM-administered lands and there is evidence that these areas are threatened with alteration. NDNH at-risk taxa are actively inventoried by NDNH and typically include those with federal or other Nevada agency status and those with NatureServe global and/or state ranks 1–3, indicating some level of imperilment. Some species are fully protected species in the state of Nevada (NAC § 527.010). Removal or destruction of state protected flora species requires a special permit from Nevada Division of Forestry (NRS § 527.270). Special status species considered are listed in Table 3.16-2 in Appendix D.

Two special status plant species were determined to have the potential to occur within the Project site, Nye milkvetch (*Astragalus nyensis*) and Pahrump Valley buckwheat (*Eriogonum bifurcatum*). Suitable habitat was not identified within the Project site for either of these species, as soils within the study area were not consistent with the substrate required by either species (Heritage Environmental Consultants, LLC 2022).

Pahrump Valley buckwheat is a BLM sensitive species and is listed by the NDNH as an at-risk species. It is endemic to the Mojave Desert and is found in the Stewart, Pahrump, and Mesquite valleys in Nevada and California (NatureServe 2022). The estimated range size is 100 to 400 square miles with 17 known occurrences in Nevada and 2 in California, with an estimated population of 1,109 individuals (NatureServe 2022). Populations are known to have wide fluctuations, locally abundant in wet years. It grows mostly in barren, saline, heavy clay, or silty hardpan soils on and near playa margins and adjacent shore terraces, stabilized sand dunes, and sandy slopes. This species is generally found at elevations from 2,200 to 2,800 feet. Pahrump Valley buckwheat usually occurs within salt desert scrub communities along with species such as allscale (*Atriplex polycarpa*), shadscale (*Atriplex confertifolia*), and desert holly (*Atriplex hymenelytra*). Threats to the species include an increase in urbanization, commercial, and residential development, agriculture conversion, off-highway vehicle (OHV) activities, and dumping.

Nye milkvetch is listed by the NDNH as at-risk and is a BLM sensitive species in California but not currently in Nevada. It grows in the foothills of desert mountains, calcareous outwash fans, gravelly flats, and sometimes in sandy soil in Mojave Desert scrub vegetation communities (NatureServe 2022). 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. Associated plants are often creosote bush, white bursage, blackbrush (*Coleogyne ramosissima*), range ratany (*Krameria erecta*), Indian ricegrass (*Achnatherum hymenoides*), big galleta (*Hilaria rigida*), and three-corner milkvetch (*Astragalus geyeri* var. *triquetrus*).

3.16.3.3 Cacti and Yucca

Six species of cacti and two species of yucca occur within the Project area. Cactus and yucca species are protected and regulated by the BLM and by the Nevada Division of Forestry. NRS 527.100 prohibits anyone from cutting, destroying, mutilating, removing, or possessing any cactus or yucca without the written permission of the owner, specifying the location and number of plants to be removed or possessed. The BLM Las Vegas RMP also generally requires salvage and transplant or avoidance of healthy cactus and yucca on BLM lands (BLM 1998).

Refer to Table 3.16-2 for species observed during surveys and the estimated total number of individuals within the study area. Total numbers are extrapolated from 24 belt transects within the different vegetation types. Belt transects are used in biology to estimate the distribution of species in relation to a certain area. Extrapolated totals for the 2,967-acre survey area yield an estimated 13,055 cacti and 56,818 Mojave yucca (*Yucca schidigera*). The average density estimated for all cacti species combined is approximately 4.4 per acre, and Mojave yucca is estimated at 19 per acre.

Table 3.16-2 Cacti and Yucca within the Project Area

Species	Density per acre	Estimated number within the Project ROW	Estimated number within the proposed development area
Beavertail pricklypear (*Opuntia basilaris* var. *basilaris*)	0.97	2,360	1,834
Cottontop (*Echinocactus polycephalus*)	1.08	2,628	2,042
Diamond cholla (*Cylindropuntia ramosissima*)	0.27	657	535
Engelman’s hedgehog (*Echinocereus engelmannii*)	0.6	1,460	1,135
Parish club cholla (*Grusonia parishii*)	0.43	1,046	813
Silver cholla (*Cylindropuntia echinocarpa*)	1.05	2,555	1,986

Species	Density per acre	Estimated number within the Project ROW	Estimated number within the proposed development area
Joshua tree (*Yucca brevifolia jaegeriana*)	—	52*	52*
Mohave yucca (*Yucca schidigera*)	19	46,227	35,929
Total	NA	**55,525**	**44,326**

Note: *Actual number counted within the study area
Source: (Heritage Environmental Consultants, LLC 2022)

A complete census for Joshua trees (*Yucca brevifolia jaegeriana*) was performed for the entire study area, resulting in 52 individuals, located mostly along the northwestern edge of the Project site and adjacent SR 160 (as shown in Table 3.16-1, pg. 3.16-2). The location of the auxiliary power/telecommunications line north of SR 160 was not surveyed for Joshua trees and would be surveyed prior to construction of the pole. The tallest Joshua tree recorded was 12 feet, and only five were less than 3 feet. Most Joshua trees (81%) were reproductive (flowering and/or fruiting) during surveys in spring of 2021.

3.16.3.4 Invasive Species

As part of the biological surveys conducted within the study area, invasive and noxious weed species were recorded (Heritage Environmental Consultants, LLC 2022). A noxious weed is a plant that has been designated by the state as a "species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate" (NRS 555.05). All noxious weeds are regulated by the Nevada Department of Agriculture. Executive Order 13112 also mandates that federal agencies whose actions may affect the status of invasive species use their relevant authorities to prevent their introduction, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause (64 FR 6183).

Invasive species were identified within the Project area; however, they are mostly found at relatively low densities. They were typically found along roads, around the bases of shrubs, where seeds often collect, and near water sources. There are no access roads into the Project site from SR 160, so weed vectors within the site are limited. Invasive species present within the analysis area include Mediterranean grass (*Schismus barbatus*), red brome (*Bromus madritensis* spp. *rubens*), red stem stork's-bill (*Erodium cicutarium*), cheatgrass (*Bromus tectorum*), Sahara mustard (*Brassica tournefortii*), Russian thistle (*Salsola tragus*), halogeton (*Halogeton glomeratus*) and African mustard (*Strigosella africana*). Sahara mustard is a Category B noxious weed species in the state of Nevada, which is subject to active eradication from the state (Nevada Department of Agriculture 2021). Puncture vine (*Tribulus terrestris*), a Category C noxious weed, is present within the vicinity of the Project site. While it was not observed during surveys, due to its proximity it could spread into disturbed areas during construction or Operations and Maintenance.

Most of the weed species encountered during surveys are annual plants, so their abundance and distribution within the Project area may vary from year to year, depending on local soil moisture and disturbance levels and the species' ability to disperse. Due to the drought conditions that persisted for the two years prior to the surveys taking place in spring 2021, there was generally no new growth of grass or annual plant species observed. Invasive species cover estimated during surveys totaled approximately 23 percent of the Project site The dominant species of invasive species observed were Mediterranean grass and red brome along all roadways and throughout the Project area, although stork's-bill, cheatgrass, Sahara mustard, and tumbleweed were also widespread but in lower densities. Low densities of African mustard were observed along SR 160. There were no major infestations observed during field surveys, but there were also few areas that were completely devoid of invasive species other than large areas of desert pavement.

Invasive species are spreading throughout the Mojave Desert region. Non-native annual grasses such as red brome, cheatgrass, and Mediterranean grass create fuel loading, which has led to increased wildfire frequency and intensity in parts of the Mojave Desert where they have been historically rare (Invasive Weeds Awareness Coalition 2006). Unlike native forbs and grasses, non-native annual grasses create continuous fine fuels that cure quickly relative to other vegetation types and provide highly flammable fuel, accelerating fire occurrence and spread throughout the desert (Fusco et al 2019). Other invasive species reduce resiliency of ecosystems by outcompeting native species, reducing diversity, and generally provide lower quality forage and habitat quality for wildlife.

3.16.4 Environmental Consequences

Methodology

Project impacts on vegetation are analyzed as temporary and permanent. Temporary impacts would generally occur during Project construction and operation and maintenance. Some temporary impacts would be short-term and include areas of disturbance that can be reclaimed and revegetated following Project construction, generally within 3 to 5 years. Long-term impacts include those that would not prevent recovery following Project completion but would remain throughout the duration of the Project operation and maintenance period, such as trimming or dust. All ground-disturbing activities where plants are removed by the roots are considered permanent impacts for the purposes of this analysis. The permanent timeframe reflects the slow recovery rates of native plant communities in desert ecosystems, which could take a century or more to fully recover, if they do at all (Abella 2010, Chambers, Brooks, et al. 2013, Copeland 2017, Lovich and Bainbridge 1999, Lovich and Ennen 2011). Recovery of disturbances with extensive areas where the soil seed bank has been removed will recover extremely slowly. This will likely not be possible where the soil seed bank has been removed. Vegetation trimming that allows for continued plant growth is considered a temporary impact; however, the duration would likely be long-term for the life of the Project.

Direct effects to vegetation include actions that cause damage or mortality to individual plants and an overall reduction in total numbers of plants as well as those that result in the loss of total area, biodiversity, vigor, structure, and/or function of vegetative habitat. Direct effects would occur in all areas that are proposed for some level of disturbance, including both temporary use areas and where permanent Project components occur (see Chapter 2: Proposed Action and Alternatives). Indirect effects are those that occur not as immediate consequences of a Project-related action but that are reasonably foreseeable side effects that would alter the characteristics or quality of a vegetative community due to changes in the surrounding conditions (such as spread of invasive species, changes in temperature, increases in fugitive dust, or herbicide drift). Indirect effects from the Project could impact vegetation within the entire 2,469-acre ROW and could extend into adjacent habitat. Table 3.16-4 shows the disturbance levels and temporal impacts to vegetation of the construction methods that would be used in constructing the Project.

Table 3.16-3 Disturbance Levels and Temporal Impacts to Vegetation

Disturbance Level	D-0	D-1	D-2	D-3
Construction Method	No impact/ avoidance	Overland travel	Clear and cut/drive and crush	Clear and cut with soil removal (grading and leveling used throughout the life of the project)
Disturbance Qualifier	No disturbance	Minimal to moderate disturbance	Moderate to heavy disturbance	Heavy disturbance
Temporal Qualifier	n/a	Temporary, short-term (3-5 years)	Temporary, long-term (30-year ROW period)	Permanent (100+ years)

3.16.5 Proposed Action

The Applicant submitted a ROW application to the BLM for a 2,469-acre application area for the proposed facilities. Within the Project site, the Proposed Action would occupy approximately 1,950 acres for construction, operation, maintenance, and decommissioning of the proposed solar facility, also referred to as the development area.

3.15.5.1 Construction Impacts

Vegetation Communities

Construction of the Project would result in direct and indirect adverse effects to vegetation on and off site. Impacts would vary with the type of site preparation methods and construction techniques employed. There are three disturbance levels (D-1, D-2, and D-3) defined by the BLM that correspond to specific construction methods (refer to 3). The disturbance intensity increases with each corresponding level whereas D-0 represents no disturbance and D-3 represents maximum disturbance. Construction methods for installation of the solar arrays and associated facilities would include grading and leveling (D-3) on an estimated 649 acres, and drive and crush (D-2) on an estimated 1,301 acres. All forms of site preparation and construction would result in disturbance or alteration of vegetation by driving across the site with machinery, direct contact with equipment, grading and leveling, soil trenching, and excavation. The Proposed Action would avoid the main ephemeral drainages, estimated at approximately 519 acres (21 percent) of the Project site, except for crossings by the main access road and linear medium voltage crossings, avoiding direct impacts to vegetation in these areas.

Permanent direct impacts to vegetation are anticipated for at least 649 acres (26 percent) of the developed area where grading or leveling (D-3) would be required for site preparation and facilities installation. Grading and leveling would remove vegetation (including root structures) and topsoils and result in high levels of soil compaction, which is expected to lead to permanent impacts to perennial vegetation, which could take centuries to recolonize the site even with restoration efforts (Grodsky and Hernandez 2020, Abella 2010). Anywhere soil disturbance is incorporated into site preparation there would be impacts to vegetation that would persist well past the anticipated 30-year Project duration (Abella 2010, Chambers, Brooks, et al. 2013, Copeland 2017, Lovich and Bainbridge 1999, Lovich and Ennen 2011). Grading soils results in the loss of the soil seed bank, which not only results in a loss of biodiversity in the area but also creates pressure on native seed sources in the Mojave Desert since most of the commercial seed available for restoration comes from wildland collections. Soil disturbance also increases the likelihood of invasive species infestations and makes restoration of the site more difficult (Chambers, Brooks, et al. 2013). Table 3.16-5 shows the temporary and permanent direct impacts to vegetation from the Proposed Action.

Table 3.16-4 Temporary and Permanent Direct Impacts to Vegetation from the Proposed Action

Proposed Action	D-0 (avoidance/no impact)	D-1 (overland travel)	D-2 (clear and cut/drive and crush)	D-3 (clear and cut with soil removal/grading)
Total acres	519	0	1,301	649
Percent of application area	21%	0	53%	26%
Percent of development area	n/a (excluded from development area)	n/a (none proposed)	67%	37%
Impacts to soils	No impacts anticipated	n/a	Temporary, long-term. No soil removal or restructuring; soil is very compacted.	Permanent. Soils are removed, restructured, and extremely compacted.
Impacts to vegetation	No impacts anticipated	n/a	Temporary, long-term. Vegetation is scraped off soil surface, crushed, and/or trimmed; seedbank remains in place, albeit buried or compacted.	Permanent. No vegetation or root structures remain; seedbank is displaced.
Impacts to cacti/yucca	No impacts anticipated	n/a	Permanent. All cacti and yucca removed.	Permanent. All cacti and yucca removed.

Drive and crush (D-2) disturbance is anticipated on approximately 1,301 acres (53% of the site), which would result in a combination of direct temporary (long-term) and permanent impacts to vegetation, depending on the extent to which plants are crushed and how repeatedly vehicle traffic occurs over an area. With this disturbance type soils are disturbed and compacted but are left in place, so the soil seed bank is retained, and recovery of some vegetation can eventually occur. Annual plant species, with adequate precipitation, may be able to resprout after disturbance, but if perennial vegetation is crushed completely (i.e., there is no standing plant material left after construction), it would likely not be able to resprout. Thresholds for vegetation to withstand repeated disturbance in arid environments are low.

Temporary (short-term) direct impacts to vegetation would occur in laydown areas and other temporary use areas, which would be restored upon completion of construction and immediately replanted and/or reseeded with native plants to begin the restoration process. Solar PEIS PDF ER2-1 includes implementing revegetation, soil stabilization, and erosion measures to ensure temporary use areas are restored. Additionally, disturbances in temporary use areas have restoration requirements and success criteria outlined in the Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan required as part of the BLM ROW Grant. Seed collection activities may be conducted on-site prior to the commencement of construction activities in accordance with BLM protocol and the requirements of the Site Restoration-Revegetation & Decommissioning-Reclamation Plan and would be used to revegetate temporary disturbance areas.

The primary affected vegetation types are Sonora-Mojave Creosote Bush – White Bursage Desert Scrub and Mojave Mid-elevation Mixed Desert Scrub. Desert species are poorly adapted to disturbance. Disturbances that disturb and remove soil would prevent most native vegetation from recovering for centuries, even with significant restoration efforts. These vegetation communities provide important habitat for wildlife species, including insects, small reptiles and mammals, birds, and listed special-status species, including the Mojave desert tortoise, in addition to supporting habitat for rare plant species. Removal of native vegetation communities affects ecosystem functions such as wildlife cover, forage, migration corridors, species interactions, mycorrhizal associations, nutrient cycling, soil retention, air quality, and carbon sequestration (Grodsky and Hernandez 2020, Beatty, et al. 2017). Solar panels also create shade that can alter soil temperature, soil moisture, and the amount of light available for plants to photosynthesize (Vervloesem, et al. 2022, Grodsky, Tanner and Hernandez 2020, Tanner, et al. 2020). These altered microhabitat conditions may affect the abundance, survival, and reproduction of native desert plants and could result in the loss of native plant communities for the duration of the Project and likely for 100 years or more after decommissioning. This long-term loss of native vegetation leads to increased weeds, dust and erosion, loss of wildlife habitat and biodiversity, and negative visual effects.

Indirect effects to vegetation would be expected to occur from construction activities both on and off site from the loss of native vegetation and increased soil disturbance. Soil disturbance can lead to the introduction, proliferation, and spread of invasive and noxious weed species that compete with native vegetation and result in habitat degradation of surrounding undisturbed areas. Invasive or noxious weed seeds present in soils would be released and could spread to areas outside the ROW. Construction of the Proposed Action would also result in increased weed vectors throughout the site, such as roads, which could facilitate the spread of invasive species throughout the site and into adjacent areas. Herbicides used on site could drift off site and impact adjacent plant communities or suppress restoration efforts after Project completion. Fugitive dust from destabilized soils, heavy equipment use, and vehicle traffic can impede photosynthesis and other metabolic processes of native plants (Hernandez, et al. 2014). In fragile desert environments, loose soils can also create enough sediment transport to bury plants.

Indirect effects are also expected to occur to vegetation in and around the site from anticipated increases in temperatures resulting from the removal of vegetation from the site (Williams et al. 2023, Adeh et al. 2019, Barron-Gafford et al. 2019, Devitt et al. 2022). One study identified temperatures to be between 5-8 degrees Celsius warmer (9 to 14.4 degrees Fahrenheit) outside of a solar facility in the Mojave Desert, with the most effects found within a 300-meter distance of the site (Devitt et al. 2022). Temperature increases could indirectly affect annual and perennial vegetation in and outside of the solar facility.

Direct and indirect adverse effects to vegetation would be reduced through the implementation of Solar PEIS PDFs, BLM-required plans, and mitigation measures. MM WILD-1 requires reduction of the solar facility footprint to only the minimum size needed for Project operation, and Solar PEIS PDF ER 2-1 requires sites to be designed to minimize adverse impacts to ecological resources. A Site Restoration-Revegetation & Decommissioning-Reclamation Plan has been drafted and is included as an appendix to the Plan of Development and will be updated based on the selected alternative. This would guide revegetation of temporary disturbance areas (including laydown areas and other temporary use facilities), as well as other measures to reduce impacts to native vegetation throughout the site. The Integrated Weed Management Plan has also been included as an appendix to the Plan of Development and would be implemented during construction and O&M, and would include 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 BLM regulations and a Pesticide Use Plan.

Solar PEIS PDFs SR2-1, AQC2-1, and MM AQ-1 require erosion and dust-control measures and a Dust Abatement Plan to prevent increased dust, erosion, and sedimentation. Dust generated by construction would be controlled and minimized by applying water and, if needed, BLM-approved palliatives would be applied. PDF SR2-1 requires installation of erosion control including in and around on-site and off-site washes. Soil stabilization measures outlined in a SWPPP would be used to prevent soil being eroded by stormwater runoff during construction.

Special Status Plants, Cacti, and Yucca

Direct and indirect effects on special status plants within the Project area may occur from the Proposed Action. No occurrences of rare or sensitive plants were identified during the botanical surveys, and there is no anticipated habitat for sensitive plants within the Project area. Drought conditions prohibited some annual plant growth during the survey time periods; however, due to the habitat conditions, no sensitive species are anticipated to be within the Project area. Implementation of Solar PEIS PDF ER 1-1 would be required to minimize impacts to individuals and occupied habitat should any species of protected plants be identified prior to or during construction. Populations in adjacent habitats could be indirectly affected by the introduction, spread, and proliferation of invasive and noxious weeds, fugitive dust, and herbicide drift. Implementation of ER1-1, SR2-1, the Integrated Weed Management Plan, and the Dust Abatement Plan would reduce these impacts to adjacent sensitive species habitats.

The Proposed Action would have direct and indirect adverse effects on cacti and yucca from construction of the Project. Approximately 1,950 acres of habitat containing cacti and yucca would be disturbed from grading or drive and crush, with the assumption that all cacti and yucca would be removed from the development areas under the Proposed Action. Repeated vehicle traffic has been shown to impact cacti more than other perennial vegetation types, and high levels of mortality would be expected (Grodsky et al. 2020). Indirect impacts from increased weed densities within the Project site and surrounding area would increase the risk of fire, which cacti and yucca are not adapted to and cannot survive. Soils in drive and crush disturbance areas (D-2) would be left in place, but cacti and yucca are slow to regenerate from seed, and reestablishment of these vegetation communities may never occur. Cacti and yucca in temporary use areas, such as laydown areas, would be salvaged and planted back into the temporary use area after construction is complete, in accordance with BLM regulations, Solar PEIS PDF ER2-1 and the Site Restoration-Revegetation & Decommissioning-Reclamation Plan.

According to density estimates determined from botanical surveys of the Project area (refer to Table 3.16-2), there are approximately 44,326 cacti and yucca present within the 1,950-acre development area. This analysis assumes that the removal of cacti and yucca would occur on up to 100 percent of the development area, either through direct removal or mortality from repeated crushing. Out of the approximately 55,525 cacti and yucca that are estimated across the entire 2,469-acre Project site, this would be a reduction in approximately 80 percent of cacti and yucca across the site. In areas where disturbance is avoided, approximately 519 acres, cacti and yucca species would be retained.

The cacti and yucca species found within the Project site are generally widespread, but they are long-lived, iconic species of the Mojave Desert and provide important habitat for wildlife. Direct loss of 1,950 acres that contain cacti and yucca would be significant due to the loss and/or reduction of habitat function these species provide. Even after Project decommissioning, these species would likely not occupy the site again for a hundred years or more in areas where they have been lost (Abella 2010). Loss of cacti and yucca would be adverse, but maintenance of the soils across 1,301 acres of the development area under drive and crush methods during construction would reduce impacts, as would implementation of Solar PEIS PDF ER2-1, SNDO-required Veg-2, and the Site Restoration-Revegetation & Decommissioning-Reclamation Plan. The Project would be required to pay a fee for all removal of cacti and yucca species that cannot be salvaged or otherwise avoided.

Invasive Species

Invasive plant species, including one noxious weed species (Sahara mustard) are common throughout the Project area; however, because the landscape is mostly undisturbed, the existing densities are relatively low. The Proposed Action has high potential to increase invasive species densities and introduce other invasive or noxious weed species adjacent areas of construction impacts given the level of soil disturbance and vegetation removal proposed. It is predicted that weed densities throughout the site would increase with increased soil disturbance, based on BLM experience after construction of other large-scale soil-disturbing projects. This would affect the Project area and the surrounding landscape by modifying native plant assemblages, reducing biodiversity, increasing competition with native species including sensitive plants, altering hydrologic conditions and soil characteristics, and increasing fire hazards.

Construction activities could introduce new species of weeds to the Project area or spread seeds of existing weeds. Invasive plant species and noxious weeds may be transported to the site in materials used for erosion control and on construction equipment and vehicles, and internal access roads would serve as weed vectors into the site. Vehicles, equipment, and crews could inadvertently track in clinging seeds and/or parts of plants, thus facilitating their spread through the Project site and adjacent habitats. Soils exposed by removal or disruption of vegetation would be more susceptible to the establishment and spread of invasive species. Disturbance to soils and removal of perennial vegetation within the solar fields could increase colonization by invasive species that are better adapted to disturbance than native desert plants (Abella 2010, Chambers, Brooks, et al. 2013, Grodsky, Tanner and Hernandez 2020). Shading by solar panels could change microhabitats and create conditions that are more favorable for non-native plants, including invasive and noxious weeds (Vervloesem, et al. 2022, Grodsky, Tanner and Hernandez 2020, Tanner, et al. 2020). While native desert flora and fauna are adapted to a relatively narrow range of environmental conditions and historically infrequent disturbance, invasive species can occur within a wide range of environmental and habitat conditions (Grodsky, Tanner and Hernandez 2020).

Solar PEIS PDFs ER1-1, ER2-1 and ER3-1 would be implemented to address the spread of weeds associated with construction activities. Invasive plant species and noxious weeds within the Project site would be managed with manual treatments whenever possible, such as hand-pulling, which can be effective in areas with small, isolated populations. Herbicides approved by the BLM and meeting Solar PEIS ER3-1 requirements would be used as necessary to control larger or more pervasive invasive plant infestations. Effective treatment of invasive species populations would comply with BLM and state of Nevada laws and regulations and are outlined in the Integrated Weed Management Plan in the Plan of Development that would be implemented during construction and operation of the Project to address management and control of invasive species. MM VG-1 requires that the Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan include identifying and treating problem weed areas before construction starts; on-site monitoring to detect new populations; treating weed populations; and implementing prevention measures, including a Worker Environmental Awareness Plan (WEAP) training required as part of the BLM ROW Grant, vehicle and equipment cleaning protocols, and construction reporting. If control measures were not conducted or a treatment window was missed, weeds could proliferate along roads or other disturbed areas (such as in areas of grading or 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. Personnel conducting weed management would need knowledge of Mojave plant communities and weed ecology.

The manual or chemical treatment of invasive plant species and noxious weeds could result in inadvertent injury or mortality to native plants that are in close proximity. Herbicides would require BLM approval and would likely include those that are not known to persist in soils or have inadvertent adverse effects on native seed banks (such as glyphosate). Spot treatments using herbicides would be utilized, as necessary. Manual treatments such as hand-pulling would not be expected to negatively affect adjacent native plants.

In the experience of the BLM, implementation of weed management plans is challenging due to rapid weed colonization of disturbed native vegetation within lands managed by the BLM. If weeds are managed, there is still a high likelihood that edge effects from the Proposed Action would increase invasive and noxious weeds in the surrounding off-site areas. While the implementation of the Solar PEIS PDFs, MMs, and Integrated Weed Management Plan described above would reduce effects associated with invasive plant species, the Proposed Action would still result in a higher cover and density of invasive plant species within the Project site and in adjacent habitat over time. These measures could reduce some adverse effects on native vegetation and special status species from the spread of 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.

Potential Fire Risk

Fire history in the Mojave Desert region is sparse and is characterized by patchy, small fires in upland habitat. Due to environmental constraints, native vegetation communities are adapted to be discontinuous and, under natural conditions, shrub interspaces are clear of vegetation during most of the year and the risk of fire is limited (Brooks and Pyke 2001, Chambers, Bradley, et al. 2014, Grodsky and Hernandez 2020). Increases in non-native annual grasses (e.g., *Bromus* and *Schismus* spp.) can produce continuous fine fuel beds that result in an invasive plant fire cycle in the Mojave Desert ecosystem (Grodsky, Tanner and Hernandez 2020). Non-native grass invasion and associated fire risk has been identified as the greatest threat to upland areas in southern Nevada (Chambers, Brooks, et al. 2013).

Disturbance from the Proposed Action may facilitate the spread of invasive, flammable annual plants and could substantially increase fire risk in the Project area. Based on the botanical report for the Project (Heritage Environmental Consultants, LLC 2022), invasive annual grasses are present but not continuous. The Proposed Action proposes measures to control and minimize the spread of invasive plant species.

Solar PV equipment would contribute to an increase in the probability of a fire occurring, primarily due to electrical risks. Electrical equipment including inverters, transformers, and battery energy storage equipment can create electrical shorts, sparks, and extreme heat buildup inside the equipment, which are some of the leading causes of fires associated with these facilities (Gradecka and Lethbridge 2018). Increased human activity and the use of vehicles and heavy equipment can also create additional sources of fire risk.

All electrical equipment would be housed in appropriately rated National Electric Manufacturers Association (NEMA) enclosures, and areas around buildings and equipment would be graded and kept free of vegetation to minimize the risk of ignition. Solar PEIS PDFs WF1-1 and WF2-1 require that solar developments are sited and designed to minimize the risk of fires and that fire prevention measures are implemented in coordination with the BLM, including inspections, monitoring, a WEAP, and adaptive management protocols for the life of the Project. MM PS-3 requires that a Fire Prevention and Safety Plan be developed and approved by the BLM prior to construction and includes measures to reduce the risk of fire from Project activities. Conducting activities that could cause a fire outside of the normal fire season, in addition to other planned minimization measures, would further reduce risk.

3.16.5.2 Operation and Maintenance Impacts

Operation and maintenance activities would involve less repetitive ground disturbance than construction and would not extend outside of areas initially disturbed for construction. Areas of drive and crush disturbance (D-2; approximately 1,301 acres) would be allowed to recover to the extent possible. Invasive species management, as outlined in the Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Integrated Weed Management Plan, would occur during operations and maintenance. Native vegetation would not be expected to regrow during operation in areas that were cleared by grading or leveling, and it is unlikely that native perennial vegetation will fully regrow in areas of drive and crush (D-2) disturbance where extensive vehicle traffic occurred. Where plants grow back, vegetation would be maintained up to 18 inches in height in areas where they interfere with panel performance.

Operational impacts are anticipated to result in continued reduction of perennial vegetation cover throughout the site where regular maintenance trimming would occur to keep vegetation from interfering with operation or safety of the Project. Ongoing crushing of vegetation and disturbance to soils from maintenance activities would continue to increase the risk for invasive species and create sources of dust. Invasive species establishment would likely require herbicide treatments to control them, which could have indirect effects on adjacent vegetation communities.

Solar PEIS PDF ER3-1 requires the Applicant to manage vegetation utilizing methods to maintain native vegetation to the extent possible and control invasive species during operation and maintenance of the Project. A Dust Abatement Plan will be implemented to control sources of fugitive dust generated during operation and maintenance of the Project, including use of water and/or soil palliatives as determined in the approved plan. Consultation with the BLM would be maintained throughout operation and maintenance in accordance with Solar PEIS PDF ER3-2, utilizing an adaptive management strategy and modifications as necessary and approved by the BLM.

3.16.5.3 Decommissioning Impacts

Decommissioning is anticipated to only directly affect areas that were previously disturbed during Project construction and operation and maintenance, and the area of temporary vegetation disturbance associated with decommissioning would be comparable to the area temporarily disturbed during construction. Potential direct and indirect effects on native vegetation communities include introduction of fugitive dust from disturbance to topsoils and colonization of the Project site by invasive weeds during and after site decommissioning.

Prior to a notice to proceed (NTP), the Site Restoration-Revegetation & Decommissioning-Reclamation Plan would be updated by the Applicant and approved by the BLM. Reclamation after decommissioning would also follow the Solar PEIS PDF requirements, including ER 4-1, which requires reclamation of the

Project site to begin immediately after decommissioning to reduce the likelihood of ecological resource impacts in disturbed areas as quickly as possible. The plan would provide details regarding the removal of all Project components, reuse of materials to the extent feasible, and site restoration activities to pre-Project conditions. Temporary disturbance areas created during decommissioning would be immediately replanted and/or reseeded with native plants to begin the restoration process. Ongoing invasive species treatments would be part of the plan to reduce the potential for invasive species introductions and spread (and associated fire risk) during decommissioning. Following decommissioning, all disturbed areas would be stabilized and revegetated as described in the plan. The plan would include restoration and revegetation measures based on BLM’s requirements, including soil replacement or recontouring as needed, acceptable seed types, seeding techniques, a monitoring and reporting plan, and success standards. The Site Restoration-Revegetation & Decommissioning-Reclamation Plan would also include measures to address site restoration until all success criteria provided by the BLM are met. Other future BMPs would likely be required.

Vegetation would be slow to recover across the site, even with restoration techniques. Native vegetation communities could take as long as a century to fully recover to pre-disturbance conditions, if at all (Abella 2010). Given the presence of invasive species growing on site and the level of disturbance proposed, the restoration time may be even longer. The cacti and yucca removed from the Project site would likely never recolonize the area. Arid and semi-arid ecosystems are particularly vulnerable to degradation and long-term loss of productivity due to characteristics such as fragile soils, naturally low perennial vegetation cover, extreme climates, and limited and variable precipitation. With the soil disturbance and compaction from constructing the solar development areas, and continued trimming of native vegetation, much of the native seed bank in the soil may not be viable, so other sources of native seed would be needed for restoration. This could put added pressure on regional seed sources, resulting in an adverse impact on adjacent communities where seeds are sourced.

The post-Project decommissioning and restoration would result in plant assemblages that are different from existing conditions. Lower perennial and annual plant diversity is anticipated wherever vegetation removal and soil disturbance occurred during construction, as seed banks in these areas would be removed. In areas where vegetation has been crushed but is left in place and roots and soils remain intact, the seed bank and some live residual vegetation species may facilitate restoration on the 51 percent of the ROW constructed using this method. Restoring native plant communities invaded by exotic species is difficult and often unsuccessful, especially in arid environments. Treatment of invasive species can be extremely costly to apply at the scale required to make meaningful progress in reducing invasive plant populations relative to their expansion. It is possible that native plant communities could be altered to the point where many of those species can no longer persist.

Decommissioning would set the Project site on a trajectory to regain some percentage of native species cover, but, given the level of disturbance, restoration is expected to take decades to reach even a percentage of reference site conditions for perennial plant communities. Many species, such as cacti and yucca, would not be expected to recolonize the site, and changes to native species composition would be permanent. The annual-plant and perennial-plant diversity over the Project site would be lost. The site is not expected to fully recover to pre-disturbance conditions, and the most that can be expected is that some cover of native perennial plants is retained during operation and reestablished after decommissioning. Overall impacts of the Proposed Action would remain adverse.

3.16.5.4 Cumulative Impacts

There are a number of projects and other management actions in the region that would contribute to cumulative impacts to vegetation, including other existing and proposed solar development projects and associated transmission lines located on nearby BLM lands. Figure 3.16-2 in Appendix D shows the distribution of vegetation communities across the Nevada and California portions of the Pahrump Valley, and Table 3.16-6 and Table 3.16-7 provide maximum direct and indirect acreages of impact on these vegetation communities associated with cumulative projects. A breakdown of private land acres by vegetation type, acres of solar development applications on BLM lands (in any stage) overlaying each vegetation type, and the overall percentage of each vegetation community impacted within the Pahrump Valley is provided in the table. Other cumulative projects are located in the analysis area, including road improvements and transmission line projects, but are not specifically accounted for due to the difficulty in estimating impact area. For analysis purposes, solar project development areas were used to calculate impacts to vegetation in the below table. Not all proposed cumulative projects entail a full build-out of the ROW application area; however, given the proximity of the projects to one another, any avoided areas between project sites would still be subject to a high degree of fragmentation and edge effects. Not all private lands are planned or proposed for full development; however, private lands cannot be used for long-term vegetation connectivity planning as no single public agency or plan governs development. Based on this estimate of maximum impacts from reasonably foreseeable future solar projects on BLM lands and development of private lands, the projects would result in impacts on approximately 31,465 acres of the 435,655 acres of BLM lands within the lower elevation vegetation types in the Pahrump Valley (Tables 3.16-5 and 3.16-6).

Table 3.16-5 Maximum Impact Potential on Pahrump Valley Vegetation Communities by Existing and Reasonably Foreseeable Solar Projects on BLM-managed Land and Potential Private Land Development

Nevada vegetation community (USGS SWReGAP)	Total acreage in the Pahrump Valley	Private lands considered impacted (acres)	Solar projects (current and reasonably foreseeable) on BLM-managed lands (acres)	Total impacted (solar projects and private land)	Percentage impacted within Pahrump Valley
Sonora-Mojave Creosote bush – White Bursage Desert Scrub	206,038	52,102	9,765	61,867	30%
Mojave Mid-Elevation Mixed Desert Scrub	115,650	1,113	1,673	2,786	2%
Sonora-Mojave Mixed Salt Desert Scrub	32,545	15,578	2,181	17,759	55%
North American Warm Desert Bedrock Cliff and Outcrop	12,825	68	0	68	< 1%

Nevada vegetation community (USGS SWReGAP)	Total acreage in the Pahrump Valley	Private lands considered impacted (acres)	Solar projects (current and reasonably foreseeable) on BLM-managed lands (acres)	Total impacted (solar projects and private land)	Percentage impacted within Pahrump Valley
Developed, Open Space – Low Intensity	12,867	0	185	185	1%
North American Warm Desert Playa	6,099	3,726	438	4,164	68%
Inter-Mountain Basins Semi-Desert Shrub Steppe	4,500	501	30	531	12%
Agriculture	1,765	0	0	0	0%
North American Arid West Emergent Marsh	73	0	0	0	0%
North American Warm Desert Wash	206	102	0	102	50%
North American Warm Desert Riparian Mesquite Bosque	34	12	1	13	38%
North American Warm Desert Pavement	2	0	0	0	0%
Totals (NV)	392,604	73,202	14,273	87,475	22%

Table 3.16-6 Maximum Impact Potential on Pahrump Valley Vegetation Communities by Existing and Reasonably Foreseeable Solar Projects on BLM-managed Land and Private Land Development

California vegetation community (USGS GAP)	Total acreage in the Pahrump Valley	Private lands considered impacted (acres)	Solar projects (current and reasonably foreseeable) on BLM-managed lands (acres)	Total impacted (solar projects and private land)	Percentage impacted within Pahrump Valley
Warm Semi-Desert Scrub Grassland	93,532	15,267	9,010	24,277	26%

California vegetation community (USGS GAP)	Total acreage in the Pahrump Valley	Private lands considered impacted (acres)	Solar projects (current and reasonably foreseeable) on BLM-managed lands (acres)	Total impacted (solar projects and private land)	Percentage impacted within Pahrump Valley
Semi-Desert Nonvascular Sparse Vascular Vegetation	31,651	255	316	571	2%
Temperate Boreal Shrubland Grassland	6,882	620	183	803	12%
Developed, urban	207	96	30	126	61%
Cool Semi-Desert Scrub Grassland	138	0	0	0	0%
Temperate forest	82	1	0	1	<1%
Totals (CA)	132,492	16,239	9,539	25,778	19%

U.S. Geologic Service (USGS) has modeled vegetation communities that overlap the Pahrump Valley. The Southwest Regional Gap Analysis Project (SWReGAP) covers the Nevada portion of the Pahrump Valley (Lowry et al. 2005). SWReGAP is not available for California, and the vegetation modeling for the Desert Renewable Energy Conservation Program (DRECP) did not cover the California portion of the Pahrump Valley. Therefore, USGS Gap Analysis Project (GAP) data, which is less detailed, but comparable, was used to delineate and evaluate vegetation communities for the California portion of the Pahrump Valley (USGS 2011). Figure 2-3 shows the distribution of these vegetation communities in the Pahrump Valley.

In total, the Southern Nevada District Office has 18,984 acres of proposed and approved solar applications in the Pahrump Valley with one solar project proposed on private land on 166 acres. On BLM lands in California, there are an additional 12,481 acres of proposed solar applications, for a total of 31,465 acres of proposed solar development on the 435,655 acres of BLM lands within the Pahrump Valley (Tables 3.15 and 3.16). There are 89,441 acres of private land within the Pahrump Valley, including both Nevada and California communities. The entire Hydrographic Basin 162 is approximately 633,766 acres. Between solar development and private lands, almost a sixth of the basin is impacted by development, and that effect is disproportionately distributed in the lower elevations of the Pahrump Valley.

The solar projects in the Pahrump Valley (Mosey, Copper Rays, Yellow Pine, Golden Currant, Larrea, Canyon Mesa Solar, Borderline Solar, Sun Baked Solar, and Bonanza Peak Solar) would involve ground disturbance and vegetation clearing, resulting in the loss of native vegetation communities, cacti, yucca, and special status plant species in the Mojave Desert region. Transportation projects along SR 160, including a recent widening of SR 160 completed in 2020 (SR 160 Phase 2 Widening) as well as proposed future road improvements and a bypass project (e.g., SR 160 and SR 159 Corridor

Improvements and SR 160 Pahrump Bypass), are also a source of past and future impacts on native vegetation communities.

Similar to the Proposed Action, these cumulative projects would also likely result in the proliferation of invasive species and fugitive dust in the area. The cumulative projects could result in increased fire frequency or intensity resulting from a combination of abundant invasive plant fuels and higher likelihood of anthropogenic ignitions and introduction of solar infrastructure that could have potentially severe ecosystem effects, adversely affecting sensitive plant communities and wildlife (Abella, Gentilcore and Chiquoine 2021, Chambers, Brooks, et al. 2013, Grodsky, Tanner and Hernandez 2020).

Cumulative impacts on regional vegetation resources include the loss of native vegetation, increased spread of invasive species, disturbance of the soil seed bank, and loss of both perennial and annual plant diversity. Although the vegetation types found in the Pahrump Valley are relatively common in southern Nevada, they are also disproportionately impacted due to urban expansion, large-scale utility projects (i.e., solar and wind), extensive and intense OHV use, wildfires perpetuated by non-native annual grasses, and climate change (Nevada Department of Wildlife 2022). Slow recovery from disturbance means impacts to these vegetation communities accumulate over time. In addition, removal of large areas of public lands from recreation access would concentrate recreational uses in other areas and increase disturbance to sensitive desert vegetation and biological soil crusts in those areas.

Cumulative effects from anticipated increases in regional temperatures would also be expected to occur to vegetation communities in the regional vicinity. Large-scale solar PV power facilities have been found to induce a landscape change such that the modified landscape is darker and less reflective. This alters the energy balance of absorption, storage, and release of short- and longwave radiation and can result in a heat island effect (Barron-Gafford et al 2016). With numerous utility-scale solar developments proposed adjacent to one another in the Pahrump Valley, there could be a notable increase in temperature around the facilities (Barron-Gafford et al 2016; Barron-Gafford et al. 2019; Devitt et al. 2022). This could compound with the effects from regional drought conditions and other climate change trends and result in large-scale shifts in vegetation communities, composition, and biodiversity within the Pahrump Valley.

The Proposed Action would contribute to the cumulative effects on regional native vegetation communities, including the loss of habitat for special status plants and the regional loss of cacti and yucca. The Proposed Action would result in the long-term degradation of approximately 1,301 acres of native perennial vegetation from drive and crush methods (D-2) and vegetation trimming, and the permanent loss of approximately 649 acres from areas that are graded for Project construction and operation. The Proposed Action could result in the loss of perennial vegetation across the entire 1,767-acre development area, including all cacti and yucca estimated (approximately 44,326 individuals). Indirect effects from invasive species and dust would be expected to extend beyond the ROW boundary into adjacent undisturbed habitat or other project ROWs. The other solar projects and associated transmission lines, either proposed or already approved and under construction would also contribute to loss of habitat, see Table 3.16-7 (based on Table 3.2-3). Disturbance level D-2 and D-3 would result in mostly long-term and/or permanent impacts to existing vegetation, including potential impacts to over 720,000 cacti and yucca individuals (assuming similar densities across the project areas). Disturbance levels D-1 and D-0 would retain most of the existing vegetation.

Table 3.16-7 Cumulative Renewable Projects Approximate Disturbance Acreages

	D-0 Acres	D-1 Acres	D-2 Acres	D-3 Acres
Proposed Action Cumulative	3,643	549	4,084	23,189
Alternative 1 Cumulative (Resources Integration across all Projects)	4,204	5,280	6,017	15,915

This cumulative vegetation loss, cacti and yucca loss, soil health loss, and an increased risk of invasive species spread would result in substantial adverse effects to these resources throughout the Pahrump Valley, resulting in reduced quality of wildlife habitat and lowered overall resilience to future disturbances such as climate change. Most vegetation within the region that would be affected by other actions is on federally managed BLM land. These other projects, like the Proposed Action, would need to develop and implement project design features and mitigation measures to minimize adverse effects to vegetation resources. Implementation of Solar PEIS PDFs for the protection of ecological resources, soils, air quality and wildland fire, as well as all relevant mitigation measures and plans developed for the construction, operation and maintenance, and decommissioning of the Proposed Action, would reduce the Project's contribution to adverse effects on vegetation resources; however, due to the amount of area within the region that could potentially be affected, the effects would remain cumulatively adverse and substantial.

3.16.6 Alternative 1 – Resources Integration Alternative

3.16.6.1 Construction Impacts

Vegetation Communities

Alternative 1 would result in fewer impacts to vegetation from construction of the Project. This alternative would require that grading be kept to 20 to 21.5 percent of the development area, which would allow for approximately 406 acres of grading (D-3). This would be a reduction of 243 acres (1percent of the ROW) of grading compared to the Proposed Action, a decrease of 684 acres of drive and crush (D-2), and 926 acres of overland travel (D-1). Within construction areas for the solar panel arrays, this alternative would require that topography, soils, and vegetation be left in place, and that the installation of solar array components would occur over these existing resources. The maximum disturbance threshold to perennial vegetation would be 40 percent of the total area of each panel array block (drive and crush, D-2), resulting in a minimum of 60 percent of native vegetation communities preserved for overland travel and/or vegetation trimming for construction (D-1). If spot grading or leveling is needed within the block, that area would be counted towards the maximum disturbance threshold for grading. Areas proposed for avoidance, which include major ephemeral drainages, would remain the same (approximately 520 acres). All other Project components would remain the same.

Vegetation that is not subject to grading, crushing, or other disturbances would be trimmed but only if its height would interfere with solar panels or create a fire risk. Trimming would reduce the height of vegetation to below the level of interference and to no less than 18 inches. Trimming would result in an overall reduction in vegetative cover, and ground disturbance associated with trimming may also result in additional crushing of vegetation. Determinations for trimming would be made on an individual solar array basis so that there would be no mass trimming actions on large areas of vegetation. Table 3.16-9 shows the temporary and permanent impacts to vegetation from the Resources Integration Alternative.

Table 3.16-8 Temporary and Permanent Impacts to Vegetation from the Resources Integration Alternative

Alternative 1 – Resources Integration	D-0 avoidance/no impact	D-1 overland travel	D-2 drive and crush	D-3 grading and leveling
Total acres	520	926	617	406
Percent of application area	21%	37%	25%	16%
Percent of development area	n/a (excluded from development area)	47%	32%	21 %
Impacts to soils	No impacts anticipated	Temporary. Soils are left in place; slight soil compaction	Temporary. No soil removal or restructuring; soil is very compacted.	Long term. Soils are removed, restructured, and extremely compacted.
Impacts to vegetation	No impacts anticipated	Temporary. If vegetation is crushed, it mostly survives; seedbank is left in place	Long-term. Vegetation is scraped off soil surface, crushed, and/or trimmed; seedbank remains in place, albeit buried or compacted.	Permanent. No vegetation or root structures remain; seedbank is displaced.
Impacts to cacti/yucca	No impacts anticipated	Temporary and permanent. Cacti and yucca within direct equipment travel paths are impacted and are trimmed to avoid interference with solar panels	Permanent. All cacti and yucca removed.	Permanent. All cacti and yucca removed.

To summarize, the primary differences between the Proposed Action and the Resources Integration Alternative are:

1. The Resources Integration Alternative requires less grading (D-3), with a grading limit of 20 to 21.5 percent of the development areas. This will result in less overall D-3 disturbance, which causes permanent impacts to soils, vegetation, and wildlife habitat past the lifetime of the project.
2. The Resources Integration Alternative requires that 60 percent of perennial vegetation density in the non-graded areas be maintained during construction through the use of Overland Travel (D-1). If this standard is not met, restoration would need to occur to meet this standard. The Proposed Action would construct using drive and crush (D-2) over the entire site, likely removing most vegetation within the non-graded areas.

With the reduction in areas to be permanently impacted through grading and a minimum threshold set for native perennial vegetation loss, this alternative would result in fewer impacts to vegetation within the ROW application area. Less impactful construction techniques would result in higher vegetation survival and plant diversity within the Project site following construction. Reduced ground disturbance would allow for more areas of native vegetation to remain and would promote quicker recovery from disturbance compared to grading or repeated crushing. Natural plant recruitment would be more likely to occur in areas with limited disturbance. Reduced soil disturbance would lead to less fugitive dust generated by construction, and in areas where soils remain intact there would be a reduced likelihood of invasive species infestations (Chambers et al. 2014; Copeland et al. 2017; Grodsky and Hernandez 2020; Kobelt 2020; Lovich and Ennen 2011).

The Resources Integration Alternative would result in lower temperatures across the site during operations, reducing indirect impacts from temperature increases as compared with the Proposed Action. Retaining vegetation within solar panel arrays reduces the temperature of the site, as compared to projects where vegetation is completely removed (Williams et al. 2023, Adeh et al. 2019, Barron-Gafford et al. 2019, Devitt et al. 2022). Decreases in temperature would result in fewer indirect impacts to onsite and offsite vegetation, and also result in an increase in panel efficiency (Williams et al. 2023, Barron-Gafford et al. 2019).

All Solar PEIS PDFs and plans required by the BLM for mitigating negative impacts to native plants and habitats from construction, operation and maintenance, and decommissioning of the Project would remain the same as the Proposed Action except for WILD-1, which is not required because Alternative 1 already incorporates this element. As compared to the Proposed Action, this alternative is in better conformance with the Solar PEIS PDFs required to minimize overall disturbance and mitigate ecological impacts.

Special Status Plants, Cacti, and Yucca

Cacti and yucca would be avoided or impacted less on the 60 percent of the site constructed with methods that preserve perennial vegetation, thus reducing the number of cacti and yucca that would require salvage or relocation compared with the Proposed Action. Larger cacti and yucca (taller than 18 inches) would still require removal or trimming if they are in a direct travel path or directly interfere with panel operation, but because soils and vegetation would be left in place, more species of cacti and yucca would remain on site as compared to the Proposed Action. Cacti and yucca in D-3 areas of permanent use would be disturbed from grading or drive and crush in the same manner as with the Proposed Action. Cacti and yucca in D-3 temporary disturbance areas (for example, laydown areas), would be salvaged and transplanted back out into those areas after construction.

Invasive Species

The Resources Integration Alternative would incorporate larger areas of native plant communities preserved and less area of heavy soil disturbance, which would result in reduced invasive species infestations and loss of the soil seed bank during the life of the Project (Abella 2010, Grodsky, Tanner and Hernandez 2020, Chambers, Brooks, et al. 2013, Lovich and Ennen 2011). There would be fewer areas of exposed soils that would be subject to the establishment and spread of invasive species.

Although disturbances to vegetation and soils across the Project site would be reduced, construction activities could still introduce new species of weeds to the Project area or spread seeds of existing weeds. Invasive plant species and noxious weeds may be transported to the site in materials used for erosion control and construction equipment and vehicles, and internal access roads would serve as weed vectors into the site. Vehicles, equipment, and crews could inadvertently track in clinging seeds and/or parts of plants, thus facilitating their spread through the Project site and adjacent habitats. Solar PEIS PDFs, mitigations measures, and the Integrated Weed Management Plan as described above for the Proposed Action would be implemented under this alternative and are more likely to be successful with fewer infestations associated with reduced ground disturbance.

Herbicide use is anticipated to be lower where soils and native vegetation are left in place, and so there would be fewer indirect impacts from herbicide on adjacent plant communities as compared to the Proposed Action.

Potential Fire Risk

Disturbances to soils and vegetation associated with the Resources Integration Alternative would be lower than the Proposed Action, which would reduce the spread of invasive, flammable annual plants. This alternative also proposes measures to control and minimize the spread of invasive species, as described in the Integrated Weed Management Plan, which would likely be more successful with reduced ground disturbance and would limit the increase in fine fuels from invasive annual grasses. Fire risk is limited when fuels are discontinuous (Chambers, Bradley, et al. 2014), which would be maintained across larger areas of the Project site under this alternative.

The risk of fire ignitions associated with electrical equipment (such as inverters, transformers, and battery energy storage equipment) would be the same as for the Proposed Action, as well as the risk of human caused fires from increased activity and the use of vehicles and heavy equipment. All Solar PEIS PDFs, plans, and mitigation measures for fire prevention and safety as described above for the Proposed Action would apply to the Resources Integration Alternative, which would limit the risk of fires caused by the Project.

3.16.6.2 Operation and Maintenance Impacts

Vegetation would be maintained throughout 60 percent of the non-graded areas of the site during the 30-year Project operations which would result in fewer weeds, less dust, less runoff, less water use, and lower temperatures. Plants and soils could recover during operation and would provide wildlife habitat. Vegetation would be trimmed as needed to prevent interference or safety issues with the solar facilities, which may reduce plant vigor and survival and may remove flowers and seeds depending on when the plants are trimmed. However, compared with the Proposed Action, the Resources Integration Alternative is expected to result in perennial plant survival, including cacti and yucca (Grodsky and Hernandez 2020). Soil seed banks, soils, biological soils, all of which support healthy, resilient plant communities, would also be more intact under this alternative. As functional vegetation communities are more likely to resist weed invasions, operations would have fewer impacts to native plant communities because there would be less competition from non-native species and less herbicide use would be required within the facility.

3.16.6.3 Decommissioning Impacts

Decommissioning under the Resources Integration Alternative is anticipated to 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 those described for construction for this alternative. Decommissioning would use similar techniques for removal of equipment (limiting passes wherever possible, staying within existing disturbances whenever possible). With less impactful construction methods, vegetation communities would recover more quickly than the

Proposed Action, and it is anticipated that vegetation would be largely intact during the operation of the facility (Grodsky and Hernandez 2020). Native seed banks and soils would be maintained over most of the Project site, which would facilitate restoration after decommissioning. Due to ongoing weed management over the life of the Project, weeds may still be present along roads and other vectors but could be controlled with an intensive Integrated Weed Management Program.

Following completion of the ROW application period, decommissioning and site restoration would be more successful due to fewer areas of permanent disturbance (D-3) as compared to the Proposed Action, and higher amounts of vegetation that would be maintained through construction and the life of the Project. Therefore, it is expected that the vegetation within the Project area would recover more easily after decommissioning and require less effort to restore the site than under the Proposed Action, and intensive restoration would likely only be needed in graded areas and in areas of drive and crush. This would result in less stress on adjacent lands for wildland seed collections to restore the site. Most importantly, it is expected that the site would recover more quickly, allowing for restoration of important Mojave Desert habitats within the area within 5 to 10 years after decommissioning, as opposed to centuries for a full recovery compared with the Proposed Action (Abella 2010; Chambers et al. 2013; Hernandez et al. 2014; Lovich and Bainbridge 1999). The long-term impacts to vegetation communities would be substantially reduced.

Implementation of the Site Restoration-Revegetation & Decommissioning-Reclamation Plan and Solar PEIS PDFs as described for the Proposed Action would reduce potential adverse effects on vegetation during decommissioning. Restoration under the Resources Integration Alternative would be achieved much more quickly than under the Proposed Action.

3.16.6.4 Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects proposed on federal lands administered by the BLM in the Nevada portion of the Pahrump Valley (Copper Rays, Golden Currant, Mosey, Canyon Mesa, and Larrea) incorporate similar construction techniques as the Resources Integration Alternative to reduce effects to vegetation, see Table 3.16-7..

In California, these assumptions are not used. The analysis does not assume similar construction techniques for projects in California because federal lands administered by the BLM in California are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. Two of the California projects, Borderline Solar and Sun Baked Solar, are located on BLM land governed by the California Desert Conservation Area Plan, as amended by the Desert Renewable Energy and Conservation Plan (DRECP). The DRECP has management actions that would restrict development in some vegetation communities or near some types of special status plants, if present. Biological surveys have not been completed for the Borderline Solar and Sun Baked Solar projects and BLM does not have enough information at this time to know which components of the projects may be built. Therefore, for the purposes of this analysis, full loss of the vegetation within those project areas is assumed. Bonanza Peak Solar is proposed on private land in California and full loss of vegetation within that project area is assumed.

Overall, if the Resources Integration Alternative were implemented with the other solar developments in the Pahrump Valley, there would be reduced cumulative impacts to regional vegetation resources, see Table 3.16-7. Less impactful construction techniques and retention of vegetation during operation of the projects would result in higher vegetation survival and plant diversity within the region. Reduced ground disturbance would promote quicker recovery from disturbance compared to grading or repeated crushing, and natural plant recruitment would be more likely to occur in areas with limited disturbance. This would lead to a higher rate of restoration success. Reduced soil disturbance would lead to less fugitive dust generated by construction and operation of the projects, and with larger areas of intact vegetation and soils there would be a reduced likelihood of invasive species infestations (Chambers et al. 2014; Copeland et al. 2017; Grodsky and Hernandez 2020; Kobelt 2020; Lovich and Ennen 2011). This would reduce the overall amount of water use required for dust suppression and herbicides to control weeds.

Regional losses of cacti and yucca would be reduced as well. With the retention of 60 percent of perennial vegetation across the solar sites in Nevada under the Resources Integration Alternative, roughly 8,600 acres containing cacti and yucca species would be preserved or minimally impacted.

The Resources Integration Alternative would also result in reduced cumulative indirect impacts from temperature increases during operation of the solar projects. Retaining vegetation within solar panel arrays reduces the temperature of the site, as compared to projects where vegetation is completely removed (Williams et al. 2023, Adeh et al. 2019, Barron-Gafford et al. 2019, Devitt et al. 2022). Decreases in temperature would not only result in fewer indirect impacts to regional vegetation, but also result in an increase in panel efficiency (Williams et al. 2023, Barron-Gafford et al. 2019).

Because the anticipated recovery time post-Project is expected to be less for the Resources Integration Alternative than for the Proposed Action (meeting restoration criteria in 5–10 years, as opposed to hundreds of years), there would be fewer cumulative impacts to the area over time. Retaining vegetation improves vegetation community resiliency for adapting to climate change impacts, as compared to the Proposed Action cumulative effects.

The key difference between cumulative impact scenarios for either a traditional development scenario, or a Resources Integration scenario, is over 25,000 acres of vegetation within the Pahrump Valley either being removed for the next 100 years or retaining some vegetation on approximately 12,500 acres in the Pahrump Valley, which would help to provide ecosystem services and some wildlife habitat for the lifetime of the ROW and facilitate reclamation after decommissioning. Table 3.16-9 shows the maximum cumulative impacts comparison on solar project acres between Action Alternatives (see also Tables 3.2-2 and 3.2-3).

Table 3.16-9: Maximum Cumulative Impacts Comparisons (only Solar Project Acres) between Action Alternatives (See also Tables 3.2-2 and 3.2-3)

	~ D-0 Acres	~ D-1 Acres	~ D-2 Acres	~ D-3 Acres
Impact Timeframe	Indirect Impacts	Temporary, short term (3-5 years)	Temporary, long term (30-year ROW period)	Permanent (100+ years)
Cumulative - Proposed Action + Traditional Development	3,643	549	4,084	23,189
Cumulative - Resources Integration Alternative	4,204	5,280	6.017	15,915

3.16.7 No Action Alternative

Under the No Action Alternative, the Rough Hat Clark Solar Project would not be constructed, and existing land uses would continue. The BLM would continue to manage the land consistent with the 1998 Las Vegas RMP. There would be no impacts to vegetation from large scale solar construction, and existing habitat conditions and trends would remain. The vegetation communities currently exhibit gradual encroachment from invasive species, which may continue to exist or expand over time.

3.16.8 Design Features and Mitigation Measures

Project design features (in accordance with the Solar PEIS) and mitigation measures are outlined in Appendix B. The Project would comply with the following Solar PEIS PDFs and MMs to mitigate adverse impacts to vegetation resources:

Solar PEIS Programmatic Design Features

- General
  - ER1-1: Project developers shall consult with the BLM and other federal, state, and local agencies in the early phases of project planning to help ensure compliance with federal regulations that address the protection of fish, wildlife, and plant resources, with appropriate federal, state, and local agencies.
  - ER2-1: Methods to avoid, minimize, or mitigate impacts on ecological resources include implementing revegetation, soil stabilization, and erosion reduction measures to ensure temporary use areas are restored.
  - SR1-1: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the project planning process to assess soil erosion and geologic hazard concerns and to minimize potential impacts.
  - WF1-1: Project developers shall coordinate with the BLM and other appropriate fire organizations early in the project planning process to determine fire risk and methods to minimize fire risk.
- Site Characterization, Siting and Design, Construction
  - ER2-1: Solar facilities shall be sited and designed, and constructed to avoid, minimize, or mitigate impacts on ecological resources.
  - AQC2-1: To the extent practicable, avoiding ground disturbance from construction-related activities in areas with intact biological soil crusts and desert pavement.
  - SR2-1: Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.
    - Lessening fugitive dust emissions and site soils compaction by avoiding unpaved surfaces with construction traffic.
    - Restoring native plant communities as quickly as possible in disturbed areas through natural revegetation or by seeding and transplanting.
  - WF2-1: Solar facilities shall be sited and designed to minimize fire risk.
- Operation and Maintenance
  - ER3-1: The developer shall manage vegetation utilizing the principles of integrated pest management, including biological controls to prevent the spread of invasive species, per the *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States, 2007 and the National Invasive Species Management Plan, 2009* and the *Final Programmatic Environmental Impact Statement for Vegetation Treatments*

Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States, 2016. Consultation with the BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.

  - ER3-2: The developer shall, in consultation with the BLM and appropriate federal, state, and local agencies, manage projects so as to minimize impacts on ecological resources during operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
  - SR3-1: Compliance with the conditions for soil resources and geologic hazards shall be monitored by the project developer. Consultation with the BLM shall be maintained through the operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
  - SR3-2: Permanent stabilization of disturbed areas shall occur during final grading and landscaping of the site and be maintained through the life of the facility.
- Reclamation and Decommissioning
  - ER4-1: Reclamation of the construction and project site shall begin immediately after decommissioning to reduce the likelihood of ecological resource impacts in disturbed areas as quickly as possible.
  - SR4-1: All design features for soil erosion and geologic hazards developed for the construction phase shall be applied to similar activities undertaken during the decommissioning and reclamation phase.
  - SR4-2: To the extent possible, the original grade and drainage pattern shall be re-established.
  - SR4-3: Native plant communities in disturbed areas shall be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of recommendations by the BLM, once decommissioning is completed.

Southern Nevada District Office Project Design Features

- Veg-1: Vegetation disturbance will be minimized to the maximum extent possible.
- Veg-2: Destruction of cacti and yucca requires a Forestry Program fee for loss of these resources.
- Veg-3: All yucca species should be avoided as much as possible, or, if knocked over during construction, moved out of direct travel paths so that they can remain intact as much as possible to continue providing microclimate and shelter for both new plants and wildlife species.
- Weed-1: No external substrates (gravel/soil/mulch) will be brought in without specific approval from BLM.
- Weed-2: All materials brought in (rocks, soils, etc.) must be certified weed-free.
- Weed-3: All vehicles must be cleaned of all dirt, mud, and seeds, before they enter the site.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Dust Abatement Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan
- Integrated Weed Management Plan

- Technical Drainage Plan
- Worker Environmental Awareness Plan
- Spill Prevention, Control, and Countermeasures Plan
- Fire Management Plan
- Hazardous Materials and Waste Management Plan
- MM AQ-1: Emissions Controls
- MM PS-3: Fire Prevention and Safety Plan
- MM WILD-1: Reduced Project Footprint

3.16.9 Irreversible and Irretrievable Impacts

Irreversible or irretrievable impacts are those that cannot be reversed or recovered. Implementation of the Proposed Action would result in irreversible or irretrievable impacts on up to 1,950 acres of native vegetation across the development area. The Proposed Action would result in the permanent loss of native vegetation on 649 acres (D-3), with additional loss and degradation of vegetation across the remaining 1,301 acres where drive and crush (D-2) would be used for the construction method. Site reclamation efforts, even with substantial effort, is not expected to restore these impacted areas to pre-Project conditions. Restoration could take decades (D-2) to centuries (D-3) on a project of this size (especially in an arid environment), and repeated restoration efforts would be necessary. Many species, such as cacti and yucca, would not be expected to recolonize the site, and changes to native species composition would be permanent. Indirect impacts from the Project (e.g., fugitive dust, spread of invasive weed species) would persist beyond the 30-year Project operations period. Permanent adverse impacts to native vegetation communities would remain with the construction techniques identified in the Proposed Action even with the identified mitigation measures.

The Resources Integration Alternative would result in irreversible or irretrievable impacts with the permanent loss of native vegetation where the site is graded (D-3), approximately 406 acres, and on up to 40 percent of non-graded areas (617 acres). This alternative would not result in irreversible or irretrievable impacts to 60 percent of the site (926acres) where perennial vegetation would be maintained throughout the life of the Project.

3.17 Visual Resources

3.17.1 Introduction

Visual resources (the landscape) consist of landforms (topography and soils), vegetation, bodies of waters (lakes, streams, and rivers), and human-made structures (roads, buildings, and modifications of the land, vegetation, and water). These elements of the landscape can be described in terms of their form, line, color, and texture. This section is based on information provided in the *Visual Resources Technical Report* (VRTR) (Panorama Environmental, Inc., 2023). The VRTR was prepared to evaluate the existing visual resources inventory and analyze visual resources and views that could be adversely affected by the Proposed Action and to provide recommendations to minimize effects. The inventory and analysis in the VRTR were prepared in accordance with BLM Visual Resource Management (VRM) system. The VRTR identified viewing locations, or *key observation points* (KOPs), from where the Project may be viewed and developed supporting photographic simulations from each KOP to assess conformance with VRM objectives. In addition, visual impacts associated with night sky qualities and glare were also evaluated in the VRTR, which are addressed in this section.

The FLPMA provides for the management and protection of public lands, including their scenic quality. Per section 505(a)(iii) of the FLPMA, ROW grants on federal lands must stipulate terms and conditions that would minimize damage to scenic quality and aesthetic values. 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 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.

3.17.2 Analysis Area

Project impacts resulting from construction, operation and maintenance, and decommissioning activities have the potential to affect visual resources both within the Project site itself and in the surrounding area. This analysis area includes the geographic area where direct and indirect Project impacts are anticipated to occur. The visual resources analysis area includes an approximately 15-mile distance surrounding the Project solar site, including the proposed RMPA area where the VRM class would change from III to IV. The proposed RMPA includes VRM class III managed land outside the Project site, and is based on the potential for indirect and cumulative effects to visual resources from multiple renewable energy projects, including the proposed Copper Rays Project, and the Yellow Pine Solar Project that is under construction. A roughly 50-mile analysis area was assessed to address potential glare for aviation infrastructure and flight paths.

A viewshed is the geographical area that is visible from a location. Comprehensive viewshed modeling was completed for the analysis area to identify areas that may offer views of the proposed solar panels and associated facilities. The viewshed model was generated within a 15-mile analysis area surrounding the Project site using Geographic Information System (GIS) software including Esri's ArcMap and Spatial Analysis Extension. The viewshed model indicates where theoretical direct line-of-sight views may occur between terrain locations and observer points used to represent the locations and heights of project components. The model is based on elevation and landform data and does not account for vegetation, existing structures, and other landscape elements that could obstruct views. The model inputs included a digital elevation model with 10-meter (32-foot) cells (USGS, 2022) covering a 15-mile area surrounding the Project site and GIS data layers with points representing the proposed maximum heights of solar panels (15 feet). Other associated facilities such as the gen-tie line poles, microwave tower, and distribution line would be taller, but there would be fewer of these tall facilities as compared to the solar panels and the details of such features would not be visible beyond a few miles, as illustrated in visual simulations prepared for the Project. As such, the viewshed modeling is conducted for the solar arrays only.

The viewshed analysis results identify areas as “visible” to a ground-level or car-level observer where there is a higher potential for views of solar panels and associated infrastructure within a 15-mile analysis area, whereas areas identified as "not visible" indicate a lower or no potential for views (refer to Figure 3-20 in Appendix D). Actual visibility and whether the Project features would be noticeable or draw viewer attention in the landscape depends on various factors, including visibility conditions (e.g., lighting, air quality, weather), angle of view (e.g., relative viewer position and view orientation), duration of view (in time or distance), and scale and spatial relationship (degree of contrast) of the Project (BLM 1986a, BLM 1984). It is possible that the Project may be visible to some degree from beyond the 15-mile analysis area, such as from elevated vantages and mountain peaks; however, the Project is not expected to draw the attention of viewers from such areas due to distance, viewing angle, and the presence of intervening and surrounding landscape features where viewer focus would be directed.

The viewshed analysis results for the Project were evaluated for general accuracy based on field observations and visual simulations prepared for the Project. In coordination with the BLM, it was determined that while the viewshed model suggests that large portions of the Pahrump Valley would have views of the Project’s solar panels, many of these areas would have limited or no views of the solar panels, particularly within the urbanized developments of the town of Pahrump, due to intervening vegetation and structures that are not factored into the viewshed model. The BLM prepared a viewshed overlay identifying portions of the Pahrump area where limited or no views of the Project are expected due to a high potential for urban screening (Leslie, 2023). The viewshed evaluation process is discussed in greater detail in the VRTR. Viewshed evaluation locations and their ratings, as well as the BLM viewshed overlay, are shown in Figure 3-21 in Appendix D.

3.17.3 Affected Environment

Sensitive Viewers and Viewpoint Selection

Sensitive viewing platforms represent specific places, areas, and features that have visual importance relative to one’s home or social, business, or recreation environment. Visual conditions, viewer experience, and viewer response are studied through the identification and selection of the most critical and representative viewpoints, referred to as KOPs. BLM guidelines for selecting KOPs stress commonly traveled routes or other likely observation points surrounding projects (BLM Manual 8431). Preliminary KOPs were selected within the Project viewshed in coordination with the BLM and refined following the field investigations. The selected 15 KOPs are identified on Figure 3-21 and described in Table 3.17-1. Of the 15 KOPs, 10 were selected in coordination with the BLM for full analysis (e.g., contrast rating, visual simulation). The remaining 5 KOPs are included for informational purposes and were not carried forward for full analysis; however, the information KOPs can be used to extrapolate anticipated visual impacts identified for the selected KOPs where the existing conditions are similar.

Table 3.17-1 Key Observation Points

KOP	Location name	Latitude	Longitude	Elevation (feet) [1]	Distance to Project site (miles) [2]	Represented viewer categories
KOPs selected for simulation and contrast rating						
1	SR 160 (southbound) /Mabes St	36.133524	−115.867886	2,982	1.4	Regional travel route Local travel route Residential area
2	SR 160 (northbound)	36.093408	−115.801519	3,350	0.07	Regional travel route
3	SR 160 (northbound)	36.055312	−115.739007	3,242	3.8	Regional travel route
5 [3]	Stump Spring ACEC /OSNHT [4]	35.984854	−115.816965	2,792	7.1	Recreation area
6	Cathedral Canyon	36.010993	−115.852786	2,792	5.3	Recreation area
7	Hafen Elementary School	36.116873	−115.905267	2,700	3.1	Local travel route Residential area
10	Superior Lane and Thorne Drive	36.084061	−115.898025	2,743	2.7	Recreational travel route Residential area
13 [3]	Trout Canyon Road	36.149771	−115.724658	4,713	5.8	Recreational travel route Dispersed recreation area
14 [3]	Carpenter Canyon Road	36.173117	−115.809285	4,298	4.3	Recreational travel route Dispersed recreation area
15	SR 160 (southbound)	36.084964	−115.788571	3,333	0.4	Regional travel route
KOPs included for informational purposes						
4	SR 160 (northbound)/ OSNHT	36.006237	−115.606155	4,100	12.0	Regional travel route Recreation area
8	Homestead Road and Turner Boulevard	36.103092	−115.957695	2,580	6.0	Local travel route Residential area
9	Homestead Road	36.069063	−115.957056	2,499	6.1	Recreational travel route Residential area
11	Pahrump Winery neighborhood	36.190341	−115.941416	2,760	7.1	Residential area
12	Trout Canyon Road	36.126193	−115.778745	3,785	2.6	Recreational travel route Dispersed recreation area

Notes:

1. Elevation at the Project site ranges between approximately 3,101 and 3,443 feet above mean sea level, with an average elevation of 3,172 feet above mean sea level.
2. Distance to Project site refers to the approximate fence line boundary.
3. KOPs 5, 13, and 14 were selected for analysis of Project impacts as well as cumulative project impacts.
4. OSHNT - Old Spanish National Historic Trail

Visual Resources Inventory

The existing landscape characteristics in the analysis area vary because of the different natural and human-made elements that occur and the diverse patterns these elements create when combined. 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 H-8410-1 Visual Resource Inventory (BLM 1986b). The primary components that comprise a VRI are scenic quality, viewer sensitivity, and distance zones.

A VRI to document the visual values within SNDO was conducted in 2011 (Otak, Inc. 2011). As part of the SNDO VRI, the existing landscape was measured in terms of its scarcity; variety of the landform, vegetation, water, color, adjacent scenery, and human-made features; and how well these features fit together. This inventory was completed after the 1998 RMP and, therefore, is not incorporated into the VRM classifications provided in the RMP. Further, the VRI indicates visual conditions and values determined in 2011 and the landscape conditions since that time have changed. Nonetheless, the VRI information provides useful baseline information to aid in the analysis of the landscape's scenic quality and viewer sensitivity within the analysis area.

Scenic Quality

Scenic quality is defined by the BLM as the visual appeal of a tract of land. The VRI process involves determining scenic quality using seven key factors: landforms, vegetation, color, adjacent scenery, scarcity, and cultural modifications (e.g., roads, buildings, railroads, agricultural patterns, utility lines). Each of these factors is ranked on a comparative basis with similar features within the physiographic province. The proposed Project is within the Basin and Range physiographic province. *Scenic quality rating units* (SQRUs) representing areas of similar physiographic conditions (e.g., similar visual patterns, texture, color, and variety and areas that have similar impacts from human-made modifications) are rated as Class A, B, or C indicating highest to lowest scenic quality. View distance and the presence or absence of vegetation, unique topographic features, and characteristic landscapes are evaluated when determining scenic quality.

The Project is located within SQRU 13: Pahrump Valley, which has been rated as Class B. SQRU 13 is defined by the broad and expansive valley, the Spring Mountains to the east, and the California border (Nopah Range) to the southwest, and vegetation is typical of the Mojave Desert. The center of the valley is urbanized by the town of Pahrump. Rural residential development occurs along roadways outside of the city. All the KOPs except KOP 4 are within SQRU 13.

Visual Sensitivity

Viewer sensitivity is defined by the BLM as the measure of public concern regarding changes to a landscape's scenic quality. The VRI process involves evaluating public concern over landscape changes by qualitatively rating six factors: types of users, amount of use, public interest, adjacent land uses, special area considerations (designated scenic values according to management decisions or other protection mechanisms), and other factors, such as access and the extent to which the landscape is viewed. *Sensitivity level rating units* (SLRUs) representing areas with similar viewer characteristics are then assigned viewer sensitivity levels of high, medium, or low.

The Project site is located within SLRU 8: SR 160, SLRU 11: Old Spanish Trail Highway, and SLRU 61: Not Delineated Areas. The proposed gen-tie line is within SLRU 11. SLRU 8 is rated as “moderate” value for maintaining visual quality due to the presence of a major state transportation route with existing power line development along the majority of highway, signage, and various disturbances and urban development (refer to KOPs 1, 7, and 11). SLRU 11 is rated as “high” value for maintaining visual quality due to the presence of the Old Spanish National Historic Trail (OSNHT) and the mesquite valley landscape as well as the travel route to Tecopa, California, along Tecopa Road/Old Spanish Trail Highway (refer to KOPs 5 and 15). SLRU 61 is rated as “low” by default because such areas have not been rated or determined to contain moderate or high visual sensitivity (refer to KOPs 6, 10, 13, and 14).

Distance Zones

Distance zones are defined by the BLM as relative visibility from travel routes or observation points. BLM uses three standard distance zones to characterize visibility, which include foreground-middleground (0 to 5 miles away, with immediate foreground in the 0 to 0.5 zone), background (5 to 15 miles away), and seldom seen (beyond 15 miles). The foreground-middleground zone includes areas seen from highways, roads, trails, rivers, or other viewing locations. Visible areas beyond the foreground-middleground zone, but usually less than 15 miles away, are in the background zone. Areas not seen (hidden from view) in the foreground-middleground or background zones, or beyond the background zone, are designated as seldom-seen.

The Project is entirely within Distance Zone 2: Bare Mountain, which is designated as the foreground-middleground zone, where visibility up to 5 miles is generally available. All the KOPs except KOPs 9 and 13 are within Distance Zone 2.

Night Sky Qualities

Although the Las Vegas RMP does not include night sky management objectives, night sky qualities and a project’s impacts on them can be considered during project planning. *Night sky qualities* generally refers to conditions that affect nighttime visibility and the opportunity for stargazing, which are affected by both natural atmospheric conditions and lighting associated with human activities. Typically, desired night sky qualities occur in undeveloped areas that are well away from urban areas where lower levels of nighttime sky glow occur (also known as *light pollution*). Because of the proximity of the Project site to the town of Pahrump, Nevada, and the city of Las Vegas, Nevada, nighttime sky glow from outdoor lighting and vehicle traffic is expected to occur as seen from around the Project site. Other development within the Pahrump Valley, such as in the vicinity of Charleston View, as well as nighttime vehicle traffic along local roads and regional highways, are expected to contribute to regional nighttime sky glow. However, clear night sky qualities are expected to occur in within portions and in the vicinity of the Pahrump Valley. Adjacent residents and recreationists in the nearby Spring Mountains may be impacted by existing light pollution and projects that could increase light pollution in the Pahrump Valley.

1998 Las Vegas Resource Management Plan

The 1998 Las Vegas RMP provides management guidance and identifies land use decisions for management of 3.3 million acres of public lands in Clark County and Southern Nye County. The Project is entirely located on BLM land within the 1998 Las Vegas RMP planning area. The 1998 Las Vegas RMP includes specific land use allocations and management direction within the planning area, including development of minerals, rights-of-way, land tenure, recreation opportunities, access, grazing, wildlife habitat, cultural resources, and other special areas with natural resource preservation objectives.

The 1998 Las Vegas RMP identifies the BLM's original VRM classes and objectives for the planning area. The RMP includes four regionally-specific management policies (VS-1-a, VS-1-b, VS-1-c, and VS-1-d) to achieve one primary VRM objective (VS-1): "Limit future impacts on the visual and aesthetic character of the public lands" (BLM 1998a). These policies direct BLM staff to designate lands in the analysis area as VRM Class II, III, or IV[1] based on the goals for retention of landscape character. Management policies VS-1-a, VS-1-b, VS-1-c from the 1998 Las Vegas RMP specify the following guidelines (BLM, 1998a), which are similar but vary slight with the objectives established in the BLM's Manual Handbook 8400:

- **VS-1-a (VRM Class II) –** Public lands designated as VRM Class II shall be managed "to retain the landscape's existing character. In these areas, authorized actions may not modify existing landscapes or attract the attention of casual viewers."
- **VS-1-b (VRM Class III) –** Public lands designated as VRM Class III shall be managed "for partial retention of the existing character of the landscape. In these areas, authorized actions may alter the existing landscape, but not to the extent that they attract or focus attention of the casual viewer."
- **VS-1-c (VRM Class IV) –** Public lands designated as VRM Class IV shall be managed to "allow allows activities involving major modification of the landscape's existing character. Authorized actions may create significant landscape alterations and would be obvious to casual viewers."

Table 3.17-2 shows the acres within the Southern Nevada District in each of the VRM Classes I through IV.

Table 3.17-2: VRM Classification Acres within the Southern Nevada District

VRM Classification	Acres	Percent
VRM Class I	1,048,874	32
VRM Class II	54,252	2
VRM Class III	1,660,150	50
VRM Class IV	533,740	16
Total	3,297,016	

The Project site is within VRM Class III which reflects the BLM's past decision to partially retain existing landscape character due to the types of the cultural, historic, and natural features and settings within the area, including the OSNHT corridor. VRM classes at the Project site and surrounding area as well as the OSNHT corridor are shown in Figure 3-21 in Appendix D. The 1998 Las Vegas RMP identifies 1,660,150 acres of land under VRM Class III objectives and 533,740 acres of land under VRM

[1] The RMP does not include directives for designating VRM Class I; the only areas within the analysis area designated as VRM Class I are wilderness and wilderness study areas.

Class IV objectives. The objectives of VRM Class III established in the 1998 Las Vegas RMP is to partially retain the existing landscape character; authorized actions may alter the existing landscape but not to the extent that they attract or focus attention of the casual viewer. The objectives of VRM Class IV allow activities involving major modification of the landscape's existing character; authorized actions may create significant landscape alterations and would be obvious to casual viewers.

3.17.4 Environmental Consequences

Methodology

Visual Simulations

BLM's VRM contrast rating process is defined in BLM Manual 8431 and involves the use of visual simulations to evaluate and characterize visual change that would be introduced by a project or management action to determine consistency with the objectives of BLM's designated VRM classes. The purpose of preparing visual simulations is to provide the public and decision makers with photorealistic examples of how a project would change the existing landscape as well as to complete the contrast rating process. Visual simulations for the Project were prepared by Truescape for the 10 selected KOPs identified in Table 3.17-1, demonstrating visual conditions associated with the Proposed Action. In addition, visual simulations were prepared for KOPs 8, 13, and 14 that depict cumulative solar project conditions within the Pahrump Valley. The simulations provide a theoretical view of the Project's appearance from each KOP after construction and during the operation and maintenance phase, which reflects the long-term visual effects of the Project and the surrounding cumulative solar projects. The simulations are included in the VRTR appendices C.1 and C.2.

Contrast Rating Analysis

BLM Manual 8431 describes the contrast rating process involved with the BLM's VRM system. The contrast rating process is intended to determine the degree to which a project or management activity would introduce new features that would either contrast or harmonize with existing landscape features. Visual Contrast Rating Worksheets (BLM Form 8400-4) are used to rate contrast at KOPs. Sections A and B of the worksheets were completed to document existing visual conditions. Sections C and D of the worksheets were completed using the visual simulations. The criteria for determining the degree of contrast followed BLM Manual 8431, 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 begins to dominate the characteristic landscape.
- **Strong.** The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Additional information regarding the contrast rating process and environmental factors is discussed in Section 4.1.2 of the VRTR. The contrast rating sheets for the Project and cumulative solar projects are included in the VRTR appendices D.1 and D.2, respectively.

Criteria for Assessing Visual Impacts and Conformance with BLM VRM Objectives

The construction, operation and maintenance, and decommissioning of the Project would result in effects on visual resources. An evaluation of visual dominance, scale, continuity, and contrast was used to determine the degree to which the Project would attract attention and to assess the relative change in character and scenic quality compared with the existing characteristic landscape. Thresholds were established to determine if the Project would conform with VRM class objectives from the selected KOPs while incorporating environmental factors and the existing landscape's scenic quality and landscape character. Criteria for assessing visual impacts and conformance with the BLM VRM Class III objectives in the 1998 Las Vegas RMP is provided in Table 3.17-. As shown in Table 3.17-, there are scenarios which would not conform with VRM Class III objectives. The Project would conform with VRM Class IV objectives.

Table 3.17-3 Criteria for Assessing Visual Impacts and Conformance with BLM VRM Objectives

Degree of contrast	To what extent would the existing landscape character be altered?	Are the landscape alterations likely to attract or focus attention of the casual viewer?	Would the landscape alterations be short-term or long-term?	Would the landscape changes conform with VRM Class III objective?
None	Little to no alteration	n/a	n/a	Conforms
Weak	Some, but minor, alterations	Not likely or Likely	Short-term or long-term	Conforms
Moderate	Some alterations	Not likely	n/a	Conforms
		Likely	Short-term	May not conform
			Long-term	Does not conform
	Major alterations	Not likely	n/a	Conforms
		Likely	Short-term	May not conform
			Long-term	Does not conform
Strong	Some alterations	n/a	n/a	Does not conform
	Major alterations	n/a	n/a	

Source: (Panorama Environmental, Inc., 2023)

Glint and Glare Analysis

Glint is defined as a momentary flash of bright light, while *glare* is defined as a semi-continuous source of bright light. Glare is generally associated with stationary objects, which reflect sunlight for a longer duration. The difference between glint and glare is duration. An analysis of the Project glare potential was completed using the ForgeSolar Solar Glare Hazard Analysis Tool (SGHAT). The SGHAT is designed to approximate the level of glare and duration (annual minutes) of exposure that may be experienced at observation points, travel routes, and flight paths, and the potential for a solar project to result ocular impacts. The ocular impact of solar glare is quantified into three categories (Ho, Ghanbari and Diver 2011):

- "Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.

- “Yellow” glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
- “Red” glare is representative of glare conditions with potential for permanent eye damage (retinal burn). Glare at this level may be associated with concentrated solar projects and does not result from PV solar projects.

Glare analysis was conducted for ground-level observation locations located within 15 miles as well as aviation infrastructure and flight paths located up to approximately 50 miles from the Project site that were identified by the Clark County Department of Aviation. The ground-level locations included the 15 KOP locations and a 6.6-mile-long segment of northbound and southbound SR 160. The aviation observer features included 9 airports (2-mile runway approaches), 3 heliports, 1 parachute jump zone, 1 equipment tower, as well as 5 designated flight paths (military training routes and victory airways), 5 standard terminal arrival route procedures for the Las Vegas Harry Reid International Airport, and 45 non-designated aviation routes. A detailed description of the glare analysis methodology and a summary of the results is provided in the VRTR. The glare analysis addresses the potential for glare associated with the proposed PV solar panels after installation during operation and maintenance when glare conditions would be greatest.

3.17.5 Proposed Action

Construction Impacts

Visual Contrast and Conformance with BLM Management Objectives

Construction of the Project would result in contrast and adverse visual impacts associated with the visibility of ground disturbance, vegetation removal, dust generation, equipment movement and vehicle traffic, material and equipment staging, and the installation of proposed facilities, including the solar array areas, operation and maintenance (O&M) facilities and the substation, the gen-tie line, and other ancillary features such as the auxiliary power/telecommunications line. Visual impacts associated with the Project would degrade existing scenic quality and viewer sensitivity at the Project site and within the surrounding viewshed. Impacts on the scenery caused by large expanses of color and muted reflectivity, forms of structures, vertical and horizontal lines of structures and conductors, silvery-grey and tan colors, and smooth textures would result from introduction of the solar array, substation, O&M facilities, fences, roads, and other facilities.

The visual simulations and contrast rating process is focused on post-construction conditions when the Project is in the operation and maintenance phase, which is when the Project’s primary and long-term visual effects would occur. For the majority of the construction period, contrast and visual impacts of the Project would be lesser than or similar to those for the operations and maintenance phase after all facilities have been installed. During peak construction, when the full extent of the Project site has been disturbed and the installation of all facilities is nearly complete, it is possible that the visual impacts may be somewhat greater and more noticeable than the operations phase prior to post-construction cleanup, restoration, and revegetation of the site; however, such conditions would dimmish immediately after restoration and then diminish gradually over time as vegetation grows in temporary disturbed areas. As discussed below for operation and maintenance, contrasts during construction are expected to range from weak to moderate to strong depending on the viewing location and would be greatest along portions of SR 160 (see KOPs 2 and 15) and from the western side of the Spring Mountains (see KOPs 13 and 14). A summary of visual contrast at KOPs is provided in Table 3.17-4 in Appendix D, including for the construction phase. Visual contrasts during the construction phase are estimated based on the anticipated visibility of trucks and mobile equipment, ground and vegetation disturbance, stockpiled materials, dust generation, and equipment installation activities in the same areas where permanent project facilities are shown in the visual simulations prepared for the operations and maintenance phase. Generally, contrasts during construction are expected to be greater than during the operation and maintenance phase because construction activities would be viewed alongside permanent project facilities.

Table 3.17-4 Summary of Visual Contrast by Project Phase

KOP	Location name	Construction [1]	Operations and maintenance	Decommissioning [2]
1	SR 160 (Southbound) / Mabes St	None	None	None
2	SR 160 (Northbound)	Strong	Strong	Strong
3	SR 160 (Northbound)	Weak-Moderate	Weak	Weak-Moderate
5	Stump Spring ACEC / OSNHT	Weak	Weak	Weak
6	Cathedral Canyon	Weak	Weak	Weak
7	Hafen Elementary School	None	None	None
10	Superior Ln & Thorne Dr	None	None	None
13	Trout Canyon Rd	Moderate-Strong	Moderate	Moderate-Strong
14	Carpenter Canyon Rd	Moderate-Strong	Moderate	Moderate-Strong
15	SR 160 (Southbound)	Strong	Moderate	Strong

Notes:

1. Visual contrasts during the construction phase are estimated based on the visual simulations and contrast rating results for the operation and maintenance phase.
2. Visual contrast during decommissioning is expected to be similar to the construction phase.

Construction would occur for approximately 18 months, after which the Project features would be visible where construction activities occurred and would be the focus of viewer attention and long-term visual impacts. While moderate and strong contrast as a result of construction activities would likely be noticeable to the casual viewer, construction of the Project by itself would only result in temporary conflicts with VRM Class III objectives due to the short-term duration of the activities. Conformance with VRM Class III objectives for the Project are primarily addressed in terms of the Project's long-term visual effects. These short term strong and moderate contrasts would conform with VRM Class IV objectives in the proposed RMPA.

Solar PEIS PDFs apply to construction of the Proposed Action and would be required to reduce potential impacts during construction. Solar PEIS PDF VR1-1 requires the Applicant to consult with the BLM in the early phases of project planning to help determine the project's potential conformance to VRM class designations and other potential constraints, thus avoiding costly unforeseen planning implications and re-design. Solar PEIS PDF VR2-4 requires the Applicant to perform a pre-construction meeting with BLM to coordinate the project construction VRM mitigation strategy, such as minimizing ground and vegetation disturbance. Solar PEIS PDF VR4-1 requires restoration of the construction site to begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of temporarily disturbed areas as quickly as possible.

Night Sky Qualities

Nighttime work activities during construction would require illumination and the use of temporary lighting fixtures such as, but not limited to, mobile light plants, headlights, and headlamps. The use of temporary lighting fixtures would be required to meet state and federal worker safety requirements. To the greatest extent possible, the nighttime lighting for work activities would be directed downward or toward the area to be illuminated and would be shielded from public view. Task-specific lighting would be used to the greatest extent practical while complying with worker safety regulations. Due to the limited time and locations where nighttime work would occur, the effects would not be adverse.

Operation and Maintenance Impacts

Visual Contrast and Conformance with BLM Management Objectives

After the construction phase, the Project facilities would be fully built and operational. Full-time staff would be on site for security and maintenance. Occasional maintenance would be required, which would ordinarily be performed in the evenings when the panels are offline. Maintenance activities would include panel washing, weed abatement, soil stabilization and, as needed, equipment repair and replacement. The Project includes major landscape modifications and the introduction of permanent facilities to a primarily undeveloped area. The extent of contrast and landscape alterations, and how noticeable those changes would be to the casual viewer, would vary by viewing location.

The Project would create weak, moderate, and strong contrast when viewed from the KOPs, resulting from the introduction of the solar facility and associated structures to an area of the Pahrump Valley where little development currently exists. While the contrasts would be visible and may be noticeable from the closest viewing locations, the Project would not attract or focus attention of the casual viewer from most of the viewing areas that were evaluated, with the exception of views along portions of SR 160 where the Project site is in close proximity (KOPs 2 and 15) and elevated views that are available northeast of the Project along the western Spring Mountains (KOPs 13 and 14), where Carpenter Canyon Road and Trout Canyon Road are located. Strong contrast at KOP 2 and moderate contrast at KOPs 13, 14, and 15 is expected to draw the attention of casual viewers, which would not be in conformance with the BLM's VRM Class III objectives as defined in the 1998 Las Vegas RMP. KOP 2 would further draw the attention due to the crossing of the SR 160 by the auxiliary power/telecommunications line which could be up to 75 feet in height. These strong and moderate contrasts would conform with VRM Class IV objectives in the proposed RMPA. At the other KOPs that were evaluated, the Project would be partially or completely screened from most viewing areas by topography and vegetation and/or views of the Project would not be prominent and draw attention due to various factors, such as separation distance, viewing angle, significant existing landscape modification, or the surrounding natural landscape features that tend to draw attention away from the Project.

The Applicant would implement Solar PEIS PDFs to reduce the visual contrast of the Proposed Action. Solar PEIS PDF 2-3 requires siting and design of solar facilities, structures, roads, and other Project elements to explore and document design considerations for reducing visual dominance in the viewshed. Considerations can include retaining vegetation where feasible, following natural contours with linear features, and treating the surfaces of buildings and other infrastructure to reduce contrast and reflectivity. Solar PEIS PDF VR3-1 requires the Applicant to monitor compliance with the terms and conditions for VRM mitigation. Consultation with the BLM would be maintained throughout operation and maintenance of the Project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM. Maintaining the visual resource design elements during operation and maintenance includes, but is not limited to, maintaining revegetated surfaces until a self-sustaining stand of vegetation is reestablished and visually adapted to the undisturbed surrounding vegetation, keeping painted and color-treated facilities in good repair and repainting when the color fades or flakes, and including dust abatement and noxious weed control in maintenance activities.

Although implementation of mitigation during construction and operations would reduce contrast to some degree, moderate and strong contrast would remain, and the likelihood of the Project attracting attention from KOPs 2, 13, 14, and 15 is not expected to be eliminated. No other feasible mitigation is known that would effectively screen the Project from view or reduce its visibility to a degree that it would not attract attention from these areas. In order for the Project to conform with BLM VRM objectives, an RMPA would be necessary to change portions of the Project within VRM Class III to VRM Class IV so that the Project site is within VRM Class IV.

An RMPA area where the VRM classes would be changed was developed by the BLM and is shown in Figure 3-22 and encompasses approximately 9,960 acres. The RMP would change VRM Class III directly affected by the project footprint, as well as the surrounding area where the project would be visible and other recent landscape modifications have occurred or are proposed (i.e., construction of the Yellow Pine Solar Project, proposed Copper Rays Solar Project) that have resulted in a reduction in scenic quality along SR 160 in the vicinity of the Project. The RMPA result is a continuation of existing VRM Class IV in the project portion of the Pahrump Valley south of SR 160 and west of Tecopa Road. Of the designated Class III areas within the Southern Nevada District Office (approximately 1,660,150 acres), approximately 0.6 percent would be modified under the RMPA, resulting in 1,650,190 acres of land under Class III objectives and 543,700 acres of land under Class IV objectives. The change in VRM Class III to Class IV in the RMPA would reduce the existing visual change limitations and allow for major landscape alterations that would be noticeable to casual viewers, including at the proposed Project site and adjacent areas that have not been disturbed, as well as at adjacent areas where landscape alterations have already occurred but the VRM was not previously changed to Class IV (i.e., Yellow Pine). In the future after approval of the RMPA, any landscape alterations, including those from the project, that may be proposed within the RMPA would conform with VRM Class IV objectives. Table 3.17-5 shows the VRM classification acres within the Southern Nevada District.

Table 3.17-5: VRM Classification Acres within the Southern Nevada District

VRM Classification	Acres	Percent
VRM Class I	1,048,874	32
VRM Class II	54,252	2
VRM Class III	1,650,190	50
VRM Class IV	543,700	16
Total	3,297,016	

Viewer Groups

Vehicle Travel Routes. There would be variable visual impacts to vehicular travel routes and motorists from the Project, including at KOPs 1, 2, 3, 4, and 15 (SR 160); KOPs 12 and 13 (Trout Canyon Road); KOP 14 (Carpenter Canyon Road); KOPs 1, 7, and 9 (Hafen Ranch Road, Kellogg Road, Homestead Road, and Mabes Street); and KOPs 9 and 10 (other recreational roads). At KOPs 2 and 15, the Project would create moderate and strong contrast where the undeveloped desert landscape is visible. The form of the Project's components would be backdropped against the horizon and clearly seen from KOP 2. Visual impacts at KOPs 1, 3, and 4 would be less due to distance, viewing angle, and screening factors. Moderate contrast would be created by the Project as seen at KOPs 13 and 14 because of the extensive size of the Project and potential glint and glare that may attract attention from viewers.

The Project would deteriorate scenery and the characteristic landscape along the southbound side of SR 160 for approximately 7 miles between Tecopa Road and south of Mabes Street, where the Project site may be seen while driving along the highway. In addition, views would be similarly affected when traveling westward along Trout Canyon Road and Carpenter Canyon Road where the Project site can be seen from elevated areas. Views of the Project from such elevated vantages along and within the western Spring Mountains would be at greater distances, where the Project feature details and prominence would be reduced; however, the trapezoidal solar arrays and associated landscape modifications within the Project footprint would be more apparent. The Project would also be seen from other local roads and recreational roads in the viewshed to some degree but would not be noticeable or draw the attention of most viewers.

Recreation Areas. Project components would be marginally visible from most recreation areas in the study area, including the OSNHT (KOPs 4 and 5), Stump Springs ACEC (KOP 5), and Cathedral Canyon (KOP 6); however, viewers that occupy the elevated foothills along the western side of the Spring Mountains where KOPs 12, 13, and 14 are located would see the moderate contrast that would result from the Project's solar field footprint within the currently undeveloped valley, along with the Yellow Pine Solar Project, which is currently under construction and can be seen in multiple KOPs. This extends to other potential viewing areas that may occur within and in the vicinity of the Spring Mountains, such as within the Mount Charleston Wilderness Area and the Humboldt-Toiyabe National Forest. While the Project would be visible and would likely draw the attention to casual viewers, expansive views of the valley and natural vegetation would remain in all directions.

Residential Areas. The Project is not expected to be noticeable from residential areas in the study area (KOPs 1, 7, 8, 9, 10, and 11) due to distance and intervening topography and vegetation that would partially or completely obstruct the low form of the solar panels. The closest residential area to the Project is located approximately 1.4 miles north along SR 160 (KOP 1), and contrast at the location was determined to be weak.

Specially Designated Areas

The congressionally designated alignment of the OSNHT would be present at the southern end of the analysis area (KOPs 4 and 5) (refer to Figure 3-21 in Appendix D). Although the trail occurs within the analysis area, because of the distance from the Project site, existing development, and intervening topography, it is anticipated that visual contrasts would be weak, and the Project would not attract the attention of casual viewers.

As discussed for recreational areas, views of the Project may be available from vantages in the Spring Mountains, including within the Mount Charleston Wilderness Area and the Humboldt-Toiyabe National Forest.

Glint and Glare

As described previously, glint is a momentary flash of bright light, while glare is defined as a semi-continuous source of bright light. Although there may be occasional glint caused by reflective surfaces associated with the Project due to the angle of the sun, it would be temporary and would not result in impacts to the viewers. Therefore, the analysis discussion below is focused on glare. The results of the glare analysis model indicate that the Project would create *green level glare* (low potential to cause an after-image) and *yellow level glare* (potential to cause an after-image), which is typical of PV solar arrays. No *red level glare* (potential to cause retinal burn) is predicted. Glare was analyzed for both ground-level observer locations as well as for aviation infrastructure and flight paths. The results of the glare analysis for these two categories are addressed separately below.

Ground-Level Observer Locations. Green level glare would be most common, with limited areas of yellow level glare predicted along portions of the SR 160 travel corridor.

Green level glare is predicted at KOP 4 which is located along SR 160 and in the vicinity of the OSNHT, approximately 12 miles from the Project site. Glare at this distance and level may draw more attention to the Project site for limited periods when visible glare would occur but is not expected to result in significantly greater visual impacts or hazards to motorists. Further, the predicted glare conditions at KOP 4 would be short in duration (less than approximately 10 minutes per day) and would vary between the months of February and October, with no glare predicted from November through January.

Green level glare is also predicted at KOPs 7, 8, 9, and 10, which are where residential areas are in the Pahrump area west of the Project site, as well as where local and recreational travel routes are located (ranging from 2.7 to 6.1 miles from the Project site). The viewshed analysis indicate that these locations are within the viewshed of the PV solar panels; however, the field assessment and visual simulations suggest that views of the PV solar panels and any light reflected from them would not be noticeable due to distance, viewing angle, and intervening topography, vegetation, and structures which are not factored into the glare analysis results. Further, as with KOP 4, the predicted glare conditions at these observer locations would be short in duration (less than approximately 10 minutes per day) and would vary between the months of February and October, with no glare predicted from November through January. Although glare at these distances (KOPs 4, 7, 8, 9, and 10) and levels may draw more attention to the Project site, green level glare is not expected to result in significantly greater visual impacts or hazards.

Both yellow and green level glare is predicted in the motorist travel direction along the northbound lanes of SR 160 where the Project site is in immediate vicinity of the highway. The green level glare directed at the highway from the evaluated PV development areas would occur for brief periods ranging from approximately 21 to 347 minutes annually and a maximum of approximately 5 minutes per day. As with the other green level glare, similar glare along SR 160 near the Project site may draw more attention but is not expected to result in significantly greater visual impacts or hazards.

Yellow level glare is predicted intermittently along an approximately 1.3-mile-long segment of SR 160 for a total of 604 minutes annually; however, the glare is only predicted along a fraction of this distance (a few thousand feet or less) and would not occur every day. The duration of yellow glare would be less than approximately 5 minutes per day between the months of February and November.

Yellow level glare has the potential to cause after image (flash blindness), which could both draw greater attention to the Project site and create brief (a few seconds at a time), periodic, and intermittent visual hazards to motorists traveling along this limited segment of SR 160. It is expected that the potential for glare hazards to motorists would be greater in the northbound travel direction due to the amount of the Project site that would be in the field of driver view where glare is anticipated. Such glare conditions would not be sustained while traveling this distance but rather are expected to last a few seconds at a time over an approximately 1-minute period, if they occur at all, due to the high travel speeds (70 miles per hour speed limit), variable terrain, and variable screening from topography, vegetation, vehicles, sunshades, and other structures. Due to the very short durations of potential exposure, adverse effects associated with yellow level glare along are not anticipated.

The Applicant would still be required to implement Solar PEIS PDF VR2-1, which requires the Applicant to site and design the Project to minimize glare, including minimizing the use of signage that can result in glare. Necessary signs would be made of non-glare materials and utilize unobtrusive colors. However, placement and design of any signs required by safety regulations must conform to regulatory requirements. With the implementation of Solar PEIS PDF VR2-1, impacts associated with glint and glare would be further reduced.

Aviation Infrastructure and Flight Paths. The *Visual Resources Technical Report* provides detailed modeling results for glare at the aviation infrastructure and flight paths located within 25 miles or greater identified by the Clark County Department of Aviation. Within the 2-mile runway approaches at all the modeled airports, green level glare was predicted at two airports (Caas and Shoshone) which is not anticipated to effect visibility. There would be no adverse effect to runway approaches due to glare from the Project.

Green level glare was also predicted at heliports, a parachute jump zone, designated flight paths, and military training routes which is not anticipated to affect visibility. No adverse effects are anticipated.

Green and yellow level glare was predicted at non-designated flight paths. As noted in the *Federal Aviation Administration Policy: Review of Solar Energy System Projects on Federally-Obligated Airports* issued on May 11, 2021, this yellow glare would be similar to glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features and is not anticipated to result in an adverse effect to pilots (FAA 2021). While no adverse effect to non-designated flight paths is anticipated, Mitigation Measure V-1 requires advanced notification to the Clark County Department of Aviation regarding the glare that may be seen while operating aircraft near the Project. As with the ground-level observers, impacts associated with glint and glare would be further reduced with the implementation of Solar PEIS PDF VR2-1.

Night Sky Qualities

Nighttime work activities during construction, operation and maintenance, and decommissioning would require illumination and the use of temporary lighting fixtures such as, but not limited to, mobile light plants, headlights, and headlamps. The use of temporary lighting fixtures would be required to meet state and federal worker safety requirements. To the greatest extent possible, the nighttime lighting for work activities would be directed downward or toward the area to be illuminated and would be shielded from public view. Task-specific lighting would be used to the greatest extent practicable while complying with worker safety regulations.

Project operation would require on-site night lighting for safety and security at selected facilities, including the O&M facilities, substation, and battery storage facility. Permanent outdoor night lighting would be provided at the administration/O&M building and on-site substation; however, some portable lighting may be required for some maintenance activities that must be performed at night. Lighting would be kept to the minimum required for safety and security in accordance with federal and state regulations. Sensors, switches, and timers would be used to keep lighting turned off when not required, and all lights would be hooded and directed downwards so as to minimize backscatter and off-site light. The Project is not expected to include any structures that would require FAA lighting (i.e., over 200 feet). While the project would not introduce a substantial number of lighting fixtures or generate significant levels of light, the Project would nevertheless be in an area with very few existing structures with lights, and the use of uncontrolled or excessive lighting could be noticed by viewers with direct line of site to lights on the Project site.

The Proposed Action includes mitigation to minimize night-sky effects. The Proposed Action would implement Solar PEIS PDF VR2-2 that includes methods to minimize night-sky effects including, but not limited to, using minimum intensity lighting that meets safety criteria, prohibiting the use of red or white strobe lighting unless the BLM approves its use because of conflicting mitigation requirements, and fully shielding all permanent lighting (e.g., full cut-off) except for collision markers required by the FAA or other emergency lighting triggered by alarms. With the implementation of Solar PEIS PDF VR2-2, impacts to night skies would not be substantial.

Decommissioning Impacts

Impacts on visual resources during the decommissioning phase of the Project are expected to be similar to the short-term effects during construction but would reduce the long-term effects associated with operation of the solar facility components (Table 3.17-). The facility would be constructed leaving ground contours and vegetation in place. Some areas of altered vegetation for roads and buildings may be visible and create contrast. Restoration would be implemented to reduce impacts. The mitigation of visual effects related to decommissioning may be satisfied by corollary biological mitigation measures that restore native habitat and vegetation cover to near pre-Project conditions along roads. While natural recovery from disturbance in deserts is typically slow and can take decades, re-seeding applicable areas with native plant seed would assist with accelerating some revegetation. Revegetation monitoring would be implemented, as described in the Site Restoration-Revegetation & Decommissioning-Reclamation Plan, to ensure revegetation efforts are successful. Remediation measures may be implemented if revegetation does not meet the success criteria. The Project site may appear disturbed and have contrast to the surrounding vegetated areas for several years, with soils visible against the surrounding landscape. Visual impacts would diminish over time as the landscape starts to return to pre-construction conditions. Visual impacts would be reduced overall through the removal of the built structures.

Solar PEIS PDF VR4-1 would be implemented to further reduce impacts, which includes methods for minimizing visual contrast associated with decommissioning and reclamation of the Project site including, but not limited to, removing aboveground and near-ground-level structures, utilizing native vegetation to establish a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape, and reapplying stockpiled topsoil to disturbed areas. With the implementation of PDF VR4-1, visual impacts following decommissioning would be reduced.

Cumulative Impacts

Cumulative project conditions within the Pahrump Valley were evaluated to determine if the Project in combination with other projects in the vicinity would result in greater adverse visual effects compared to the Project by itself. Specifically, the cumulative analysis for visual resources considered the solar development projects that have been approved and are currently being constructed (e.g., Yellow Pine Solar Project) or have been proposed and are currently under review. Cumulative projects include the solar development projects within the proposed RMPA area, the Copper Rays Solar Project, and the Yellow Pine Solar Project. Visual simulations were prepared by Truescape to depict the cumulative solar projects compared to the Project at KOPs 5, 13, and 14, and additional contrast rating sheets were prepared to determine if the combination of projects would result in greater levels of contrast. Additional visual simulations of the cumulative projects were prepared by Panorama for the Golden Currant Solar Project and included in the VRTR for informational purposes to provide more views of the simulated cumulative projects.

In addition to the Project, the cumulative simulations depict conceptual post-construction conditions for the approved or proposed solar development projects in the Project vicinity as of September 2022 which involved modeling solar panels within the proposed development extent similar to the Project. Separate transmission infrastructure and other ancillary facilities associated with the cumulative projects were not modeled due to the varying stages of design for each project and limited access to applicant design data. While the gen-tie line, on-site substation, and O&M building are depicted in the cumulative simulations only for the Project, these features are not expected to be noticeable for the other projects due to the separation distances between the cumulative projects and KOPs 5, 13, and 14 and the fact that these features for the Project and other existing transmission infrastructure are difficult to discern in the Project simulations for these KOPs.

Where visible in the selected view directions, the cumulative simulations include Copper Rays, Rough Hat Nye, Yellow Pine, Mosey, and Golden Currant Solar Projects. After the simulations were prepared, additional proposed projects were identified that were not specifically depicted in the simulations, which may also be visible from the KOPs. The additional cumulative projects that are not simulated include Cathedral Solar, located immediately south of Golden Currant along Tecopa Road; Borderline Solar, which is within California and abuts the state border, and Sun Baked Solar and Bonanza Peak Solar, which are also located in California, near the community of Charleston View. From KOP 5, the additional cumulative projects would not be visible due to the selected view direction facing north and the presence of intervening topography and vegetation. From KOPs 13 and 14, the additional cumulative projects may be visible in the distance and could result in incremental increases in the contrast ratings; however, the conclusions are expected to remain the same because of the already large scale of solar projects proposed in the valley.

The cumulative project conditions as seen from KOP 5 are indistinguishable, and the findings of weak contrast and conformance with VRM Class III objectives for the Project would remain the same. The cumulative project conditions as seen from KOPs 13 and 14 would further contribute to contrast and visual impacts associated with form, line, color, and texture due to the noticeable increase in geometric, dark solar development that would be visible covering a large portion of the valley floor as well as the lines created from the combination of adjacent solar projects and the irregular gaps between them. The overall contrasts identified for the Project are expected to increase from moderate to strong with the cumulative solar projects. As with the Project by itself, the cumulative project conditions would likely attract the attention of casual viewers, which would not conform with VRM Class III objectives and as noted, the RMP amendment would change the VRM Class III area to VRM Class IV bring the full area into conformance with the RMP, an approximately 0.6 percent change to VRM Class III. Where the cumulative projects are within VRM Class IV, major landscape modifications would conform with the objectives.

The cumulative solar projects in the Pahrump Valley (e.g., Copper Rays, Golden Currant, Yellow Pine, Mosey, Rough Hat Nye, Borderline, Sun Baked, Bonanza Peak, and Larrea) would all be anticipated to cause some green and yellow glare. This glare could combine with the glare from the Proposed Action such that the glare would occur for a longer duration throughout much of the Pahrump Valley. While the cumulative glare would occur over a larger area, it would remain similar to glare pilots routinely experience from water bodies, glass-façade buildings, parking lots, and similar features and is not anticipated to result in a cumulatively adverse effect.

3.17.6 Alternative 1 – Resource Integration Alternative

Visual impacts of the Alternative 1 would be similar to those described for the Proposed Action, including for contrast, conformance with VRM objectives, viewer groups, specially designated areas, glint and glare, and night sky qualities. Visual conditions as seen from the KOPs that were evaluated would be approximately the same, and any differences are expected to be minor or indistinguishable. While the Resources Integration Alternative would reduce grading and retain additional vegetation compared with the Proposed Action, the same impact conclusions and recommendations for the Project also apply to the alternative. Alternative 1 would conflict with VRM Class III objectives due to the nature of the proposed solar development within a previously undeveloped area of the Pahrump Valley, the proximity of the Project to SR 160 (KOPs 2 and 15), and the elevated vantages to the northeast, where the Project footprint may be seen (KOPs 13 and 14).

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects developed in Nevada incorporate similar techniques as those of the Resources Integration Alternative to reduce effects to habitat in the Pahrump Valley. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley. These changes would not substantially change the cumulative visual analysis compared with the Proposed Action.

3.17.7 No Action Alternative

The current landscape in the visual analysis area is characterized by Pahrump Valley's flat to low desert hills and washes with southern desert shrub vegetation. Existing human modifications in the Project area are limited to OHV travel in washes. Under the No Action Alternative, the BLM would not authorize the ROW grant to construct, operate and maintain, and decommission the Project. Under the No Action, an RMPA to change the VRM Class III to VRM Class IV would not occur as part of this project. However, with the proposed solar applications in the area, a RMPA may still be considered possible as part of any of the other reasonably foreseeable solar projects. Additionally, a selection of the No Action for this project does not prohibit future solar projects from proposing development in this same area, and such future projects may warrant consideration of an RMPA for the VRM Class III if those objectives are not meet. No new disturbance to the characteristic landscape would occur, and no new elements or patterns would be introduced to the area. Therefore, there would be no new visual impacts.

3.17.8 Design Features and Mitigation Measures

The following PEIS design features have been identified to avoid, minimize, and/or mitigate potential visual impacts from development of the Proposed Action as identified and discussed in the PEIS (Appendix A.2.2.12) and Project-specific mitigation measures:

Solar PEIS Programmatic Design Features

- PDF VR1-1: Project developers shall consult with the BLM in the early phases of project planning to help determine the proposed project's potential conformance to VRM class designations and other potential constraints, thus avoiding costly unforeseen planning implications and re-design.
- PDF VR2-1: Solar facilities shall be sited and designed to minimize glint and glare.
- PDF VR2-2: Solar facilities shall be sited and designed to minimize night-sky effects.
- PDF VR2-3: The siting and design of solar facilities, structures, roads, and other project elements shall explore and document design considerations for reducing visual dominance in the viewshed and shall comply with the VRM class objectives in conformance with VR1-1.
- PDF VR2-4: Project developer shall perform a pre-construction meeting with BLM or their designated visual/scenic resource specialists, such as a landscape architect, to coordinate the project construction VRM mitigation strategy.
- PDF VR3-1: Compliance with the terms and conditions for VRM mitigation shall be monitored by the project developer. Consultation with the BLM shall be maintained through operations and maintenance of the project, employing an adaptive management strategy and modifications, as necessary and approved by the BLM.
- PDF VR4-1: Reclamation of the construction site shall begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of temporarily disturbed areas as quickly as possible. Developers shall coordinate with BLM in advance of interim/final reclamation to have BLM or other designated visual/scenic resource specialists, such as a landscape architect, on-site during reclamation to work on implementing visual resource requirements and BMPs.

Southern Nevada District Office Project Design Features

- Vis 1: Utilize components with anti-reflective coating where feasible.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Lighting Plan
- Mitigation Measure V-1: Provide advanced notification to the Clark County Department of Aviation regarding the glare that may be seen while operating aircraft near the Project such that the Department of Aviation can notify regional airport managers, if necessary.

3.17.9 Irreversible, Irretrievable, and Residual Impacts

Irreversible, irretrievable, and residual impacts are those that cannot be fully reversed or recovered. This analysis considers irreversible impacts as those that permanently affect visual uses (i.e., not addressable through Project restoration or reclamation). Irretrievable impacts are those lost visual resource opportunities that occur during the lifespan of the project, which would be reinstated only after Project site reclamation is complete. The Proposed Action and its alternatives are anticipated to share the following irreversible, irretrievable, and residual impacts:

- Project components would be visible.
- Landscape scarring and revegetation would be visible long after Project site reclamation.

Changes to the characteristic landscape would occur over the 30-year lifetime of the Project and would represent an irretrievable impact but would not create irreversible impacts. Beyond the life of the Project, the visible structures and materials would be removed from the Project area. However, it could take years or decades before the Project footprint is no longer visible and the vegetation returns to its pre-construction condition. The vegetation that would be established during reclamation efforts would take several growing seasons to establish, and the composition of species in the recovery area would for several seasons be visibly different from the original and surrounding vegetation communities. This visible difference would allow for the Project footprint to be visible for many years or decades beyond the Project life and would represent an irreversible impact.

Residual impacts are adverse effects remaining after mitigation has been applied, including the PDFs, Lighting Plan, and Mitigation Measure V-1 identified for visual resources. Implementation of the identified mitigating features and procedures would reduce visual impacts associated with the Project to varying degrees based on specific locations where the Project would be visible, including impacts associated visual contrast, glare, and night sky qualities. Implementation of PDFs and mitigation would minimize contrast from the Project to the extent possible; however, moderate and strong contrast would remain during all of the phases until the site is reclaimed due to the Project's overall visibility from public vantages. Without implementation of these measures, the Project would result in similar moderate and strong contrast, but the Project may be more noticeable to casual viewers from some vantages. Similarly, implementation of mitigation to address impacts associated with glare and night sky qualities would further minimize impacts; however, these impacts were not considered to be significant adverse effects for the Project. Without implementation of these measures, impacts associated with glare and night sky qualities would be slightly greater but would not be considered adverse effects.

3.18 Water Resources

3.18.1 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. None of these resources are considered Waters of the United States (WOTUS) and thus are not subject to section 404 of the Clean Water Act. The surface water information provided in this section is from the *Conceptual Drainage Report* (WSP 2021) and *Supplement to Conceptual Drainage Report* (WSP 2023). The *Supplement to Conceptual Drainage Report* was prepared to address post-development drainage conditions. An Aquatic Resource Jurisdictional Delineation was prepared in December 2022 to assess whether aquatic resources are present and potentially subject to USACE and EPA jurisdiction under section 404 of the Clean Water Act (CWA) (33 USC § 1344) or USACE jurisdiction under section 10 of the Rivers and Harbors Act (RHA) (33 USC § 403) (Huffman-Broadway Group, Inc 2022). Candela received a letter from the USACE on November 22, 2023 concluding that all identified aquatic features on the Project site are not waters of the U.S. regulated under Section 404 of the CWA or under Section 10 of the RHA.

Groundwater is water found underground in the cracks and spaces in soil, sand, and rock (Groundwater Foundation, 2023). It is stored in and moves slowly through geologic formations called *aquifers*. The groundwater information for the Project is provided in the *Water Supply Assessment* technical memorandum (Candela Renewables, 2023). Candela provided a letter detailing the *Water Supply Agreement* for the Project on July 24, 2024.

The CWA (33 USC §1251–1387) is the primary law protecting water quality in surface waters by setting limits to pollution discharges, both regulatory and nonregulatory, and regulating quality standards for surface waters. 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 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 responsibility includes overseeing water right applications, appropriations, and interbasin transfers (NDWR 2010). In accordance with NRS section 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. Candela began the process of providing the applications for use of water to the State Engineer in July 2024. Although the State Engineer has primary authority and responsibility for the allocation and management of water resources within the planning area, the BLM's sustained yield mission requires the agency to ensure that authorized uses do not permanently deplete renewable resources such as water. Additionally, Department of Interior policy directs the BLM to adopt policies which encourage the management of water as a renewable natural resource (600 DM 2). Additional regulations and laws pertaining to water resources are described in Appendix C.

3.18.2 Analysis Area

The landscape consists of long alluvial fans with fan remnants and inset fans with slopes ranging from 2 to 15 percent (Huffman-Broadway Group, Inc 2022). Flow within the Project site is influenced by SR 160 as the flows from the upstream watersheds get distributed across multiple washes as flows approach SR 160.

Potential impacts resulting from construction, operation and maintenance, and decommissioning activities have the potential to affect water resources located on and off the Project site. The analysis area for surface water and jurisdictional waters consists of the 2,469-acre Project site. This analysis area considers all anticipated surface-water impacting activities associated with the Proposed Action, including the up to 1 acre of ground disturbance associated with the auxiliary power/telecommunications line north of SR 160. The analysis area for groundwater and water consumption consists of the Project site and the Pahrump Valley administrative groundwater basin. Water for the construction and operation of the Proposed Action would be sourced from within 5 miles of the Project site (Candela Renewables, 2023).

3.18.3 Affected Environment

The affected environment includes all surface and groundwater resources that could be impacted through the development of the Project and action alternatives.

Surface Water

The Project site is located on an alluvial fan surface that receives flow from Lower Pahrump Valley, Cottonwood Spring, Browns Spring, and Trout Canyon watershed areas. The Project lies within the Ivanpah-Pahrump Valley 8-digit hydrologic unit (16060015) and the Lower Pahrump Valley (160600150508), Cottonwood Spring (160600150506), Browns Spring (160600150505), and Trout Canyon (160600150504) 12-digit HUC sub-watersheds. The Pahrump Valley sub-basin has no downstream surface water connections to other basins, and surface water flows terminate in a topographically and hydrographically closed dry lakebed in California's Inyo County. Most washes within the analysis area have an ephemeral flow regime, only conveying flow during heavy precipitation events; however, some may also convey snowmelt, discharged from intermittent springs in years with heavy snowfall.

Flow within the Project site is influenced by SR 160 roadside ditches that concentrate the flow on the north side of the highway before conveying the flows into 17 culverts ranging in size from two 36-inch culverts to five 60-inch *corrugated metal pipes* (CMP). The flow depths are generally less than 0.5 feet throughout the Project site with concentrated flow reaching up to 3.5 feet in some washes. Velocity is less than 1 foot/second for the majority of the site, with maximum velocity in some washes reaching up to 5.5 feet/second.

Surface water flow onto and across the Project site is the direct result of precipitation. No evidence of groundwater discharges, such as from springs or seeps, was observed during the field surveys. Approximately two-thirds of the analysis area contains ephemeral streams that direct surface flows to the west before being intercepted by municipal development in Pahrump. The remaining surface water flows within the analysis area are directed southwest by ephemeral streams continuing largely uninterrupted across the Nevada–California border (Huffman-Broadway Group, Inc 2022).

The Federal Emergency Management Agency (FEMA) publishes Flood Insurance Rate Maps (FIRM) that delineate *special flood hazard areas* (SFHAs). Zone A is defined as a SFHA subject to inundation by the 1-percent annual chance flood event (100-year) for which no base flood elevations have been established. Zone A flood hazard areas are typically delineated by approximate methods. The northwest corner of the Project site is located in a Zone A SFHA as shown in Appendix D, Figure 3-20 (WSP 2021).

Groundwater

Groundwater in Nevada is an important water supply source, providing approximately 40 percent of the total water supply used in the state. According to the Southern Nevada Water Authority, 10 percent of the water supply for southern Nevada, primarily Clark County, is sourced from groundwater (SNWA 2023). In contrast, the principal source for municipal drinking water for Nye County and the Pahrump Valley is groundwater (Nye County 2012). The Project site is in the Pahrump Valley sub-basin (Hydrographic Basin 162), in the

Central Region (Region 10) of the NDWR administrative groundwater basins (Nye County Water District 2018). The Nevada portion of the Pahrump Valley Groundwater Basin has a total surface area of 504,960 acres (789 square miles) (NDWR, 2021). USGS publications indicate the presence of a hydraulic connection between Pahrump Valley and the Amargosa Desert through Stewart Valley, located northwest of the Pahrump Valley (Belcher 2018) (Faunt 2010).

The Pahrump Valley sub-basin has been classified as a "designated groundwater basin" by the State of Nevada, meaning that all permitted groundwater rights are approaching or exceed the estimated average annual recharge. The Pahrump Valley sub-basin has an estimated annual recharge rate of 20,000 acre-feet per year (AFY), with permit allocations greatly exceeding that number. The annual duties of permitted, certificated, and claims of vested groundwater rights within the Pahrump Valley Hydrographic Basin total approximately 59,736 acre-feet (NDWR, 2023). The NDWR performed a groundwater pumpage inventory in 2021 for the Pahrump Valley (NDWR, 2021). The inventory showed that the total estimated groundwater pumpage for calendar year 2021 was 13,870 acre-feet, the majority of which is from domestic use and irrigation (NDWR, 2021). This pumpage amount is within the sustainable yield estimates for the basin, and the NDWR Basis Status Assessment Map Series (November 2023) identifies a moderate decline in the Pahrump Valley Basin, a substantial groundwater commitment compared with the perennial yield (greater than 350%), and no overage of the average pumping versus perennial yield (NDWR, 2023). However, it should be noted that the pumpage estimate is based on an average of 0.5 AFY of use by the 11,629 domestic wells in Pahrump Valley Hydrographic Basin 162. Each of these domestic wells is legally entitled to 2 AFY and as such, pumpage in the Pahrump Valley Hydrographic Basin 162 could be up to 31,311 AFY which would be outside the sustainable yield estimates. The Nye County Water District noted that Pahrump Valley Hydrographic Basin 162 is severely over appropriated and under extensive pumping stress from residential use (Nye County Water District 2022). It further noted that certain areas of Basin 162, notably in the community of Pahrump, are experiencing pumping stress while other portions of Basin 162 have excess water. This corresponds with data provided from three BLM monitoring wells that show that in the Pahrump Valley, water levels are dropping fairly consistently from the current use of water (BLM 2022). Other nearby natural resources that rely on groundwater include springs and groundwater-dependent vegetation or riparian habitat such as the mesquite bosque south of Pahrump.

Jurisdictional Waters

Although the aquatic resources identified during the technical analysis did not meet the USACE and USEPA technical wetland criteria, wetland hydrology indicators present on site include water marks, sediment deposits, drift deposits, and drainage patterns. These waters were classified as "other waters" under the Clean Water Act. In addition, several of the ephemeral washes continue beyond the Project site, where they flow across the Nevada–California border before terminating in a dry lakebed to the southwest. The remaining ephemeral washes that flow west are intercepted by municipal development within the town of Pahrump. Based on the site conditions, the *Aquatic Resources Delineation Report* identified aquatic resources present that fall into two categories of potential WOTUS using the definitions of WOTUS from December 2022 for *ordinary high water mark* (OHWM) and interstate waters.[1] The USACE reviewed the *Delineation Report* and determined that the aquatic resources did not meet the WOTUS definition.[2]

Table 3.18-1 summarizes the types of aquatic resources identified in the *Aquatic Resources Delineation Report* within the Project area having an OHWM indicator based on December 2022 USACE definitions. Since this time, the USACE responded to the *Aquatic Resources Delineation Report* and determined that the aquatic resources did not meet the WOTUS definition. Aquatic resources that do not meet the definition of WOTUS due to the lack of an interstate or foreign commerce connection (33 CFR § 328.3(a)(3)) are also included since the Applicant requested a *preliminary jurisdictional determination* (PJD) from the USACE.

Table 3.18-1 Aquatic Resources Not Subject to CWA Section 404 Jurisdiction

Delineation category	Type of delineation request	USEPA/USACE definition	Area (acres)	Area (linear feet)
All interstate waters	PJD	Other waters: ephemeral washes with OHWM indicators found	2.7	7,754.18
Tributaries of interstate waters (33 CFR § 328.3(a)(5))	PJD	Other waters: ephemeral washes with OHWM indicators found	1.3	5,142.18
Tributaries of intrastate waters determined to have no interstate or foreign commerce connection (33 CFR § 328.3(a)(3))	PJD	Other waters: ephemeral washes with OHWM indicators found	42.7	71,030.96

Source: (Huffman-Broadway Group, Inc 2022)

3.18.4 Environmental Consequences

Methodology

Surface Water

Surface water conditions were modeled pre-development and post-development to assess projected impacts to surface water flows both on and off site as a result of the Proposed Action. The pre-development modeling used two different modeling software programs to evaluate the 100-year flood event for the upstream mountainous areas and alluvial fan areas, where the Project site is located, including the USACE Hydrologic Engineering Center, Flood Hydrograph Package, HEC-1 and FLO-2D, respectively. The Trout Canyon

[1] Analysis in this section is based on the 2022 WOTUS definition as this was the legal standard at the time of preparation of the *Conceptual Drainage Report* (WSP 2021) and *Supplement to Conceptual Drainage Report* (WSP 2023). In August 2023, the USACE issued a final rule that amends the "Revised Definition of 'Waters of the United States'" to conform key aspects of the regulatory text to the U.S. Supreme Court's May 25, 2023 decision in the case of *Sackett v. Environmental Protection Agency*. The conforming rule became effective on September 8, 2023. As the 2022 WOTUS definition allows a broader and less stringent qualification for WOTUS, analyses based on the 2022 WOTUS definition would be more conservative than the 2023 WOTUS definition because more waters on-site would be potentially covered under the 2022 definition. USACE would also analyze WOTUS on-site under the current definition during permit applications.

[2] Jurisdiction is defined as the official power to make legal decisions by an agency or legal entity while 'jurisdictional waters' refers to waters that are subject to the requirements of the CWA. Jurisdiction of a water body does not necessarily mean that the water body is a jurisdictional water that is subject to CWA requirements.

watershed (27 square miles) was modeled with HEC-1, and the area downstream of the Trout Canyon watershed (10 square miles) was modeled using FLO-2D. The results of the modeling for existing conditions and the Proposed Action are shown in Figures 4.1 and 4.2 of the *Conceptual Drainage Report* (WSP 2021).

Two post-development models were prepared using the FLO-2D program (Storm 1 – Post-Development Condition looked at storm depth difference, and Storm 2 – Post-Development Condition looked at storm velocity difference). The models assumed that all the vegetation on site would be removed through drive and crush, with minor grading to smooth out the slope for solar arrays (WSP 2023).

The models were prepared in accordance with the Clark County Regional Drainage District (CCRFCD) *Hydrologic Criteria and Drainage Design Manual* (HCDDM) design guidelines. Infrastructure recommended in the drainage study was incorporated into the Project's preliminary design.

Groundwater

Groundwater impacts could occur if on-site groundwater pumping were utilized to supply construction and operational water needs. The Project applicant is in the process of purchasing water from an offsite vendor within the five-mile buffer around the Project area and trucking the water to the site. The groundwater basin conditions were reviewed, and the effects of the use of 800-acre feet of water were considered in the context of other groundwater uses for the Proposed Action and 720-acre feet for Alternative 1. Candela provided a letter summarizing the *Water Supply Agreement* for the Project that includes a "provision obligating the Project to purchase and relinquish water rights in order to offset construction water use. Under this provision, construction water use would be totaled at the conclusion of construction, amortized over the anticipated lifespan of the project, and a matching volume of water rights purchased and retired. At the end of the Project's lifespan, the retirement would ensure Project water neutrality with ongoing benefits to the basin in perpetuity." As such, this obligation is considered in the cumulative analysis.

Jurisdictional Waters

Field studies were conducted on June 1, 2022, and September 6 through September 10, 2022 to: 1) determine the presence or absence of wetland vegetation, hydric soil, and hydrology indicators of wetland conditions as defined by the USACE methodology; 2) determine if field indicators of wetland conditions may be "significantly disturbed" or "naturally problematic;" and 3) within any non-tidal drainage or depressional area found, determine if OHWM indicators are present and document the location(s) of the OHWM. The field survey was conducted during a moderate drought following a 90-day period of precipitation ranging from normal to wet conditions occurred (Huffman-Broadway Group, Inc 2022).

3.18.5 Proposed Action

Construction Impacts

Surface Waters

Surface hydrologic features in the Project area include mainly ephemeral stream channels or drainages and alluvial fans. Several incised drainages cross the Project site due to the presence of existing culverts under SR 160 and would be avoided by Project design. Site grading and vegetation removal would disturb on-site soils, and while some drainages would be avoided by site design, impacts to water quality, primarily from the transport of sediments could occur. Impacts to water quality could also occur due to potential spills or releases of fuels, hazardous materials, or herbicides. The alteration of surface water flows on the Project site could also cause a minor increase in downstream flow velocity as a result of Project construction.

Two types of site preparation would be implemented during construction: clear and cut/drive and crush (D-2) and clear and cut with soil removal (D-3) (see definitions in Section 2.2). Table 2-2 provides estimated percentages for each site preparation method used for Project construction and Table 2-3 provides disturbance acreage for each site preparation method. Within the solar arrays, drive and crush would be the primary construction method; however, some limited leveling may be required to overcome individual topographical challenges. Grading and soil compaction can alter natural drainage patterns by changing percolation rates and topography of the site. The removal of vegetation and root masses can alter drainage patterns because the vegetation no longer retains water or holds the soil. Lack of vegetative cover can also result in an increase in soil erosion and sedimentation as loose soil particles and sands are more easily transported off site via stormwater runoff. As noted in the *Conceptual Drainage Report*, post-construction flow depths and velocities would slightly increase due to grading. Solar PEIS PDF WR 1-1 would require that the Proposed Action ensure flow depths and velocities remain similar to the pre-construction conditions and that the Project does not increase off-site flooding potential or decrease natural flows for downstream vegetation, soil moisture, and hydrologic connectivity.

Some sedimentation occurs naturally, especially in desert environments during heavy precipitation events, which are prone to erosion and flash floods. However, removal of vegetation across the Project site would result in an increase in soil erosion and sedimentation above existing conditions as exposed, loose soils, and sands are more easily transported off site via stormwater runoff. The downstream water quality impacts from sedimentation caused by stormwater runoff could be greatest during Project construction as construction involves the greatest amount of soil disturbance. The largest incised drainages that traverse the Project site would be avoided and left largely unaltered, and land contours would be preserved to maintain existing site hydrology to the extent possible. Approximately 80 acres adjacent to one of the drainages, which was avoided in the original site plan, would be developed, increasing the ground disturbance occurring throughout the site. However, only the main Project access road, parallel to SR 160 along the northeast boundary of the Project site, would cross the incised drainages. The widths of the avoided drainages vary between 50 feet and 1,600 feet. The solar arrays would be set back at least 20 feet from the edge of the avoided drainages, and underground electrical collection crossings of the incised drainages would be minimized. A stormwater management plan, equivalent to a Stormwater Pollution Prevention Plan, would be prepared and implemented during construction and would include installation of Project-specific erosion control BMPs. 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; and using temporary stabilization (e.g., erosion matting or blankets, soil stabilizing agents) for areas that are not actively under construction. BMPs would be implemented throughout construction to minimize erosion and sedimentation off site and thereby minimize impacts to downstream water quality. Additionally, a Working in Waterways Permit would be required from the Nevada Department of Environmental Protection for all work in waters of the state (NRS § 445A.415). Adverse effects to downstream water quality from sedimentation caused by construction would be reduced with these measures.

Clark County requires an approved drainage study for construction of facilities that disturb more than 2 acres. Drainage studies would be used to develop a Project-specific Technical Drainage Plan required as part of the BLM ROW Grant that would be approved by the BLM prior to the start of Project construction activities. The Technical Drainage Plan would be used in conjunction with Project Grading Plans to establish drainage patterns on site that reduce the risk of surface water runoff to the extent feasible. Implementation of these industry-standard design plans would reduce potential risks to water quality from impervious surface drainage.

Construction of the Project would involve the use, storage, and disposal of hazardous materials, and spills of fuels, hazardous materials, herbicides, and other chemicals could occur. All use, storage, transport, and disposal of hazardous materials would be in strict accordance with all state and federal regulations and guidelines. A Spill Prevention, Control, and Countermeasure (SPCC) Plan would be developed prior to construction, if required by applicable law or regulation, in accordance with regulations (40 CFR part 112). The stormwater management plan would establish procedures to minimize the effect of accidental releases of fuels and hazardous materials on water quality. Herbicides would only be applied in accordance with a *pesticide use permit* (PUP) to ensure that water quality is protected. Although spills could still occur, the likelihood of significant spills is considered low and would not have lasting effects on regional water quality. Refer to Section 3.9: Public Health and Safety for more information on hazards and hazardous waste.

Groundwater Supply

The primary use of water during construction would be for compaction and dust control during earthwork for grading of access roads, foundations, equipment pads, and spot grading throughout the Project site. Smaller quantities of water would be required for preparation of the concrete for foundations and other minor uses. Subsequent to earthwork activities, water usage would be used for construction of the O&M facility, substation, internal access roads, and solar arrays. The total water used during construction would be approximately 800 AF.

The hydrographic basin beneath the analysis area is a "designated groundwater basin," all water rights in the area have already been appropriated. The 800 AF of groundwater withdrawals would be purchased from existing basin allocations and thus there would be no new allocations associated with the Proposed Action. Construction water needs for dust control and other washing needs would be obtained from a commercially available source and trucked to the Project site. The water would be stored in aboveground tanks that would be filled daily during the construction period. While water would be purchased from existing allocations, the permit allocations for the basin greatly exceed the annual recharge rates and could still result in adverse effects during construction to the groundwater basin and other uses of the groundwater basin water as noted in the Nye County Water District scoping comment on the Project. Adverse effects to other uses of the groundwater basin would be especially likely to occur in certain portions of the hydrographic basin, notably near the community of Pahrump, which are already experiencing pumping stress. No unauthorized pumping would occur and purchasing water would be in compliance with any NRS and unlikely to result in a long term adverse effect to the groundwater basin due to the one-time nature of the construction water requirement. It is the role of the NDWR to oversee these applications and it is beyond the scope of this EIS to analyze the overall groundwater basin allocations. Nonetheless, use of 800 AF of water from an overallocated groundwater basin could be an adverse effect to other nearby water well users or other nearby groundwater-dependent springs or vegetation. Valley springs, such as Stump Springs, traditionally discharge water at a relatively steady flow throughout the year, and fluctuation of the spring is caused by interference of nearby discharging wells (Maxey and Jameson 1948). Depending on the ultimate location of the purchased water, nearby springs could be adversely affected by the Proposed Action groundwater use. Riparian vegetation, such as the mesquite bosque, south of Pahrump, could also be adversely impacted by additional groundwater pumping depending on the location of the well and whether it would be in addition to existing pumping or replace existing pumping. Solar PEIS WR 1-3 requires considering water conservation measures related to solar energy technology water needs to reduce Project water requirements and also potential monitoring of water use during construction of the Project and adaptive management protocols.

Groundwater Quality and Groundwater Recharge

Aquifers are recharged by infiltration of precipitation to the subsurface. Increasing the acreage of impervious surfaces in an area can adversely affect groundwater recharge by decreasing the amount of water that infiltrates to the subsurface. Impervious surfaces resulting from Project construction would total an estimated 84 acres. Graded areas and roadways, which are semi pervious, would equal an additional 584 acres, for a total of 668 acres of impervious or semi-pervious, less than 0.1 percent of the entire 93,100-acre Pahrump

Valley Groundwater Basin. The graded areas and roadways would be discontinuous and narrow, linear areas. Accordingly, the Proposed Action is not expected to affect groundwater infiltration in the basin.

Jurisdictional Waters

No jurisdictional ephemeral dry washes and/or channels cross the southern portion of the Project site. The Proposed Action would not impact jurisdictional waters during construction and operation through placement of fill in the jurisdictional waters. The Applicant would not be required to obtain a Section 404 permit.

Operation and Maintenance Impacts

Surface Water

As part of the *Conceptual Drainage Report,* the Project site was divided into 15 cross-sections to analyze pre- and post-development flows through the cross-sections. Post-development flows would be similar to pre-development flows for each of the cross-sections. Flow depths within the Project site would remain similar to flow depths under pre-development conditions. Both pre and post development, flow depths across the majority of Project site are less than 0.5 foot except for within the incised washes, where flow depths average less than 1 foot but may experience concentrated flows up to 3.5 feet in certain areas. Velocities within the Project site are also anticipated to remain similar to existing velocities under the pre-development conditions. Velocities across the Project site pre- and post-development are estimated to be less than 1 foot/second; however, velocities in the washes may reach up to 5.5 foot/second. Modeling does indicate that the flow depths and velocities would increase slightly due to grading. The flow depth difference ranges from 0.01 to 0.34 foot, and the velocity depth difference ranges mostly from 0.01 to 1.0 foot/second but from 1.01 to 2.03 feet/second in one wash. Refer to Figures 3.3.S1 and 3.4.S1 of the Supplement to *Conceptual Drainage Report* for more information on the estimated depth and velocities between pre- and post-development conditions (WSP 2023). Flows would remain confined in established washes for most storm events at the 10-year storm event level and below. Flooding that could cause substantial damage on or off site is not anticipated. Solar PEIS PDF WR 1-1 would require that the Proposed Action ensure flow depths and velocities remain similar to pre-construction levels and that the Project does not increase off-site flooding potential.

Native vegetation not impacted during construction would be avoided during Project operation to the maximum extent possible, and vegetation would be retained in any areas not directly needed for construction or operations. Vegetation would be maintained at a height of up to 18 inches during operation to prevent vegetation from impacting the performance of the arrays. Determinations for trimming would be made on an individual solar array basis such that there would be no mass trimming actions on large areas of vegetation. The clearing of vegetation on the Project site under the Proposed Action would result in increased transport of sediments associated with increased flows. However, sedimentation off site would be minimal, and there is not a major receiving body in the analysis area or Project site. No effects on downstream structures from sedimentation or sediment deposits are anticipated.

Perimeter fencing is not anticipated to increase flooding risks or hazards. Impacts to flows and flooding would be minimal from pile installation given the small size of each footprint. Gen-tie towers or poles would occupy a small surface area. The gen-tie poles are not expected to result in substantial changes in surface water flows that could cause off-site flooding and would not impact a 100-year floodplain. Internal roads within the solar development areas and gen-tie access roads could channelize water and increase localized erosion, resulting in increased sedimentation of nearby washes. The internal and gen-tie roads would be bladed and compacted if needed to ensure stability. The internal roads would be crowned or cross-sloped, depending on topography, which would limit channeling and erosion. The effects of channeling and erosions from the roads would be minimal given the road design and limited acreage impacted.

Dust palliatives may be used during operation and maintenance (and potentially during construction) with BLM concurrence. Dust palliatives are not anticipated to affect surface waters because the components break down sufficiently and have not been found offsite or downstream from the location of use. Herbicides may also be used during operation and maintenance activities with BLM concurrence. Herbicides can mobilize into stormwater and cause downstream water quality impacts. Weed abatement using herbicides or manual and mechanical means would occur in accordance with the approved Integrated Weed Management Plan and Pesticide Use Program required as part of the BLM ROW Grant. Vegetation would be maintained on site through a combination of mowing native species, with mechanical and chemical treatments. Weed abatement equipment (chemical or mechanical) would be utilized in accordance with the Integrated Weed Management Plan and Pesticide Use Program approximately twice per year, for 2 to 3 days per occurrence, unless as dictated in the plans.

To minimize impacts associated with the use of herbicides and dust palliatives, Solar PEIS PDF WR 3-1 requires monitoring water quality in areas adjacent or downstream from the Project site to ensure water quality is protected. Adverse water quality effects would be minimized with implementation of PDFs.

Groundwater Supply

During operation and maintenance, water use would be relatively low as compared to construction and limited primarily to PV array washing, potable water for employees, and the potential for periodic dust control and maintenance applications. Estimated operational water requirements would be up to 16 AFA. Operation and maintenance would require 1 AFY of the total 16 AFY trucked to the site for fire suppression and on-site sanitation and the remaining would be required for panel washing. Drinking (potable) water would be supplied for workers on site and stored in proximity to the operation and maintenance building. Operational water needs would be obtained from a commercially available source and trucked to the site. Groundwater withdrawals associated with operational water needs would be purchased from existing basin allocations. While the water used during operation and maintenance would be greatly reduced compared to construction, the groundwater basin would still be overallocated, and potential adverse effects to other groundwater users could occur although at a much-reduced rate. Solar PEIS WR 1-3 requires considering water conservation measures related to solar energy technology water needs to reduce Project water requirements and would ensure no water is used unnecessarily. Solar PEIS WR 1-3 requires Project developers to coordinate with the BLM and other Federal, state, and local agencies early in the planning process to secure a reliable and legally available water supply to meet Project water needs. The quality of the water source would meet Federal, state, and local requirements and would be rated for irrigation/agricultural use.

Groundwater Quality and Groundwater Recharge

Minimal groundwater recharge occurs in the Project area due to limited precipitation in the region. The Project would not prevent groundwater recharge as 65 percent of the Project development area would remain pervious and uncompacted. Vegetation would be retained in any areas not directly needed for construction or operation. Vegetation would be maintained at a height of up to 18 inches during operation to prevent vegetation from impacting the performance of the arrays. Determinations for trimming would be made on an individual solar array basis such that there would be no mass trimming actions on large areas of vegetation. All other vegetation outside of construction areas would be left intact. The Project would have negligible impacts on groundwater recharge.

Jurisdictional Waters

Project operation and maintenance would avoid jurisdictional waters. No impacts to jurisdictional waters would result from Project operation and maintenance.

Decommissioning Impacts

Decommissioning would include the removal of the solar facility and reclamation of the site back to natural conditions, as described in the Site Restoration-Revegetation & Decommissioning-Reclamation Plan required as part of the BLM ROW Grant. No new impervious areas would be required during Project decommissioning activities. Decommissioning would require approximately one-third the amount of time compared to construction. The total water used during decommissioning would be approximately one-third the amount needed for construction, approximately 260 AFY. Impacts on surface water and groundwater from decommissioning activities would be similar to those associated with Project construction and would be mitigated through the implementation of BMPs such as controlling water runoff and directing it to temporary settling basins during decommissioning; minimizing vegetation removal; recontouring and revegetating Project roads that are no longer needed; and using temporary stabilization (e.g., erosion matting or blankets, soil stabilizing agents) for areas that are not actively being decommissioned. Revegetation and recontouring of the Project site during decommissioning would reduce flow rates and erosion after the Project has been removed. Following decommissioning, potentially hazardous materials, including hydrocarbons, would be removed from the site, and disposed of in accordance with the Site Restoration-Revegetation & Decommissioning-Reclamation Plan. No new impacts would result.

Cumulative Impacts

Cumulative impacts to water resources under the Proposed Action would be limited to the Pahrump Valley sub-basin (Hydrographic Basin 162). Temporary impacts to surface water would occur from other projects located directly adjacent to the Project site that would have the potential to incrementally add to increased sediment or introduce contaminants to the surface flow areas. However, these projects would be subject to their own NEPA review and the same requirements, such as a stormwater management plan and BMPs, to prevent increased runoff, erosion, sedimentation, and contamination of surface water resources.

Several linear cumulative projects would be constructed within the same watershed as the Project site 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, vegetation removal would not result in a noticeable increase in overland flows or sedimentation of waterways. No cumulative adverse effects on surface waters would occur.

There are seven potential cumulative solar projects within the same hydrographic basin in Nevada, if constructed, would require water for dust suppression during construction, operation and maintenance, and decommissioning. The sources of water for these projects are not known but would likely also come from nearby groundwater basins, including Pahrump Valley Hydrographic Basin 162. It is most likely that the Copper Rays and Purple Sage projects would overlap construction with the Proposed Action, and several cumulative solar projects are anticipated to operate concurrently within the same hydrographic basin (refer to Section 3.2: Affected Environment). As noted, the Proposed Action proposes to use a total of 800 AF of water during construction; Copper Rays proposed to use 1,750 AF total during construction, and Golden Currant proposes to use 1,000 AF total during construction. The remaining solar projects may not overlap with construction of the Proposed Action but would likely draw water from Basin 162 or connected basins and would cumulatively draw from the overallocated basin. While the water for the cumulative projects would be required to be purchased from existing water rights, the Pahrump basin is already overallocated and cumulative effects on the groundwater basin would be adverse, in particular if the wells used for the cumulative projects water were in proximity to the wells in the community of Pahrump that are already experiencing pumping stress. The Proposed Action would contribute to these cumulative withdrawals from the overallocated sub-basin during construction and would combine with future proposed solar projects listed in Table 3.2-2 to result in a temporary adverse cumulative effect to groundwater. This could temporarily impact other uses within the sub-basin, including nearby wells and natural resources such as springs and groundwater-dependent vegetation. In addition, USGS groundwater modeling indicates the presence of a hydrogeologic connection between the Pahrump Valley and the Amargosa Valley. This suggests that significant drawdowns of the Pahrump Valley basin could have the potential to temporarily affect discharge in the Amargosa Valley, including natural springs and the Wild and Scenic Amargosa River. Temporary cumulative impacts on surface water and groundwater resources could be adverse.

After the end of construction, the Project *Water Supply Agreement*, requires Candela to purchase and retire the amount of water used during construction amortized over the life of the Project, up to almost 27 AF per year for the Proposed Action. As such, by the end of the Project's operational lifetime, anticipated at 30 years, the Project would have retired the same amount of water used during construction, for a net zero use of allocated water rights from the basin. Because the water allocation would be permanently retired, any additional years would reduce the overall potential for pumping from the groundwater basin. As such, cumulatively, over the life of the Project, the Project would benefit the overallocated basin.

3.18.6 Alternative 1 – Resources Integration Alternative

Construction Impacts

Grading and soil compaction can alter natural drainage patterns by changing percolation rates and topography of the site. The removal of vegetation and root masses can further alter drainage patterns as the vegetation is no longer present to retain water and provide integrity to the soil composition. Lack of vegetation can also result in an increase in soil erosion and sedimentation as loose soils and sands are transported off site via stormwater runoff.

Alternative 1 would result in fewer impacts to surface waters from construction of the Project. Alternative 1 would result in a minimum of 60 percent of native vegetation communities preserved (926acres) through construction using overland travel, which would offset more intensive site preparation methods (D-2 and D-3) that would be implemented under the Proposed Action. The development area for D-2 would be reduced by 684 acres (approximately 52 percent reduction) compared to the Proposed Action. Grading activities under D-3 would be limited to 20 to 21.5 percent of the total development areas (an estimated 406 acres) in the solar field which represents a 643-acre (approximately 37percent) reduction compared to the Proposed Action. Areas proposed for avoidance, which include major ephemeral drainages, would remain the same (approximately 519 acres).

With the application of less intensive and less disruptive construction methods, on-site vegetation would have a higher likelihood to survive and regrow after construction and during operation and maintenance. Surface runoff rates across the Project site would not increase substantially due to the maintenance of vegetation on site. Erosion and sedimentation would be reduced due to retention of vegetation. Therefore, Alternative 1 would result in fewer impacts to drainages compared with the Proposed Action. Alternative 1 would still require Solar PEIS PDFs to ensure any erosion and runoff does not cause downstream effects.

Alternative 1 would require a similar amount of groundwater as the Proposed Action: 720 AF. It is possible that due to the reduced amount of grading and drive and crush site preparation, even less water would be required for dust control. While Alternative 1 would use less water than the Proposed Action, the effects to groundwater and the groundwater basin would be similar to the effects described for the Proposed Action because the basin conditions remain the same and 720 AF could still result in localized effects to wells that are already experiencing pumping stress.

No jurisdictional ephemeral washes and/or channels cross the southern portion of the Project site. Alternative 1 would not cross or have any effects to the jurisdictional waters similar to the Proposed Action.

Operations and Maintenance Impacts

With the application of less intensive and less disruptive construction methods, on-site vegetation would have a higher likelihood to survive and regrow during operations. Vegetation would be maintained throughout 60 percent of the non-graded areas of the site during the 30-year Project operations which would result in fewer weeds, less dust, less runoff, and less water use (see Section 3.16, Vegetation, Special Status Plants, and Noxious Weeds). Surface runoff rates across the Project site would not increase substantially due to the maintenance of vegetation on site. Erosion and sedimentation would be reduced due to retention of vegetation. Therefore, Alternative 1 would result in fewer impacts to drainages compared with the Proposed Action during operations and maintenance activities.

Decommissioning Impacts

Decommissioning under the Resources Integration Alternative is anticipated to affect areas previously disturbed during Project construction. Decommissioning would result in direct and indirect effects on soils and native vegetation communities similar to those described for construction for this alternative. The removal and disturbance of soils and vegetation may alter drainage patterns and increase erosion and sedimentation.

Decommissioning would use similar techniques as construction such as limiting passes wherever possible and staying within existing disturbances whenever feasible. Following completion of the ROW application period, decommissioning and site restoration would be more successful due to fewer areas of permanent disturbance (D-3) as compared to the Proposed Action, and higher amounts of vegetation that would be maintained through construction and the life of the Project. Erosion and sedimentation would be reduced due to retention of vegetation. Therefore, Alternative 1 would result in fewer impacts to drainages compared with the Proposed Action after decommissioning. However, Alternative 1 would still require Solar PEIS PDFs to ensure any erosion and runoff does not cause downstream effects.

Cumulative Impacts

Cumulative impacts of the Resources Integration Alternative assumes that all cumulative solar projects developed in the Nevada portion of the Pahrump Valley incorporate similar techniques as those of the Resources Integration Alternative to reduce effects in the Pahrump Valley. It does not assume similar techniques for projects in California as they are governed by a different management plan and are under different jurisdictions than the projects in the Nevada portion of the Pahrump Valley.

Build-out of the Nevada portion of the Pahrump Valley with solar development utilizing less intensive and less disruptive construction methods, similar to Alternative 1, would increase the likelihood for on-site vegetation to survive and regrow after construction and during operation and maintenance. The presence of vegetation and decreased disturbance of soils is expected to decrease erosion and sedimentation compared to traditional construction methods. Furthermore, the additional vegetation remaining on site for the cumulative projects in Nevada would further support the stormwater management plan and BMPs required to prevent runoff, erosion, and sedimentation and the subsequent contamination of surface water resources. Therefore, if all of the cumulative projects in the Nevada portion of the Pahrump Valley implemented resource integration methods similar to Alternative 1, fewer impacts to drainages and water resources are anticipated.

Cumulative effects of the alternative to the groundwater basin would remain the same as the alternative construction methods assume a similar amount of water use, 720 AF, so would have the same potential to result in a cumulative effect to groundwater during construction. As with the Proposed Action, after the end of construction, the Project *Water Supply Agreement*, requires Candela to purchase and retire the amount of water used during construction amortized over the life of the Project, up to 24 AF per year for Alternative 1. As such, by the end of the Project's operational lifetime, anticipated at 30 years, the Project would have retired the same amount of water used during construction, for a net zero use of allocated water rights from the basin. Because the water allocation would be permanently retired, any additional years would reduce the overall potential for pumping from the groundwater basin. As such, cumulatively, over the life of the Project, the Project would benefit the overallocated basin.

Cumulative effects to jurisdictional drainages would be reduced through implementation of the resources integration methodologies because it would avoid more natural habitat, including some which would likely include jurisdictional drainages.

3.18.7 No Action Alternative

Under the No Action Alternative, the Project would not be constructed, and no impacts to surface water, groundwater, or jurisdictional waters would occur. Surface water would continue to flow unobstructed, and no groundwater resources would be consumed in the construction or operation and maintenance of the Project. Water resources would not be affected.

3.18.8 Project Design Features and Mitigation Measures

Project design features (PDFs) (in accordance with the Solar PEIS) are listed in Appendix B. The Project would comply with the following Solar PEIS PDFs to minimize adverse impacts to water resources:

Solar PEIS Programmatic Design Features

- WR 1-1: The Project developer shall control Project site drainage, erosion, and sedimentation related to stormwater runoff.
- WR 1-3: Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the planning process in order to identify water use for the solar energy project, and to secure a reliable and legally available water supply to meet Project water needs.
- SR 2-1: Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.

Southern Nevada District Office Project Design Features

- Hyd-1: Reconstruct drainage channels during decommissioning.
- Hyd-2: Provides culvert dimensions and requirements.
- Hyd-3: Provides silt fence requirements.
- Hyd-4: Provides silt fence construction requirements.
- Hyd-5: Requires minimizing erosion.
- Hyd-6: Provides low water crossing requirements.
- Hyd-7: Requires drainage protection.
- Hyd-8: Requires drainage and run-on/run-off diversions and provides diversion dimensions.
- Hyd-9: Requires erosion minimization.
- Hyd-10: Prohibits placing soils in WOTUS.

Plans required as part of the BLM ROW Grant and Mitigation Measures

- Technical Drainage Plan
- Grading Plan

- Spill Prevention, Control, and Countermeasure (SPCC) Plan, if required by applicable law
- Stormwater Pollution Prevention Plan or equivalent
- Hazardous Materials and Waste Management Plan
- Integrated Weed Management Plan
- Site Restoration-Revegetation & Decommissioning-Reclamation Plan

3.18.9 Irreversible or Irretrievable Impacts

Because the 800 AF of groundwater withdrawals for construction, and the 16 AF of groundwater withdrawals for operations would both be purchased from existing basin allocations, there would be no new groundwater allocations associated with the Proposed Action. No irreversible or irretrievable impacts to water resources or hydrology would result from implementation of the Proposed Action or alternatives. Surface waters impacted by the construction of access roads associated with the Project could be restored to pre-construction contours to the extent feasible after the 30-year lifespan of the Project.

CHAPTER 4. CONSULTATION AND COORDINATION

4.1 Introduction

This chapter summarizes the consultation and coordination activities conducted for the Project with interested agencies, organizations, tribes, and individuals. There are two primary public participation opportunities in the NEPA process: the scoping period and the Draft Resources Management Plan Amendment (RMPA)/ Environmental Impact Statement (EIS) review period. The scoping period includes presenting and soliciting input on the Project from the public and provides opportunities for the public and agency representatives to provide comments. During the Draft RPMA/ EIS review period the public has an opportunity to comment on the environmental document.

4.2 Public Involvement Process

4.2.1 Scoping

The Bureau of Land Management (BLM) published a Notice of Intent (NOI) to prepare an RMPA/EIS for the Project in the *Federal Register* on October 21, 2022, which initiated a 45-day public scoping period for the Project, ending on December 5, 2022. The BLM hosted two virtual public scoping meetings for the Project, one on November 15 and one on November 16, 2022. Forty-one people virtually attended the scoping meeting held on November 15, and 32 people attended the scoping meeting held on November 16. Attendees included representatives from state and local agencies as well as private organizations and individuals. The BLM received 54 emails and letters during the scoping period. A Scoping Report was prepared to summarize the comments addressed (Panorama Environmental, Inc. 2023).

The Scoping Report is available at: https://eplanning.blm.gov/eplanning-ui/project/2019992/570.

4.2.2 Draft RMPA/EIS Public Comment Period

The Draft RMPA/EIS was published to the BLM National NEPA Register concurrently with the publication of the Notice of Availability (NOA) in the *Federal Register* on January 12, 2024. The publication was followed by a 90-day public comment period ending on April 11, 2024 to receive comments on the Draft RMPA/EIS. The BLM held one in-person meeting and one virtual public meeting on January 30, 2024 and February 2, 2024 to provide the public with information on the Draft RMPA/EIS, respond to questions, and gather public comments. The in-person meeting had 66 attendees and the virtual meeting was attended by 20 people.

The BLM received written comments by mail, email, and verbal comments transcribed at the in-person and online public meetings, and through the online comment form on the BLM National NEPA Register website. The BLM received a total of 207 submissions (See Appendix G: Public Comment, Responses, and Revisions to the Draft Environmental Impact Statement). All comments on the Draft EIS were given equal consideration, regardless of the method of submittal and whether or not the submittal was part of an organized letter writing campaign. In responses to the substantive comments (as defined under 40 CFR 1503.4(b)) received, the BLM made corrections to analyses or data used in the EIS or explained why the comments do not warrant additional changes to the EIS. The substantive and non-substantive comments received, the BLM's response to substantive comments, and additional information regarding the comment receipt and response process are included in *Appendix G: Public Comment, Responses, and Revisions to the Draft Environmental Impact Statement*.

Copies of the Rough Hat Clark Solar Project Proposed RMPA/Final EIS are available for public review at the following locations:

- Bureau of Land Management, Southern Nevada District Office
  4701 N. Torrey Pines Drive, Las Vegas, Nevada 89130
- Pahrump Community Library
  701 East Street, Pahrump, Nevada, 89408
- Tecopa Branch Library
  408 Tecopa Hot Spring Road, Tecopa, California, 92389

The Proposed RMPA/Final EIS is also available at: https://eplanning.blm.gov/eplanning-ui/project/2019992/570.

4.3 Formal Consultation with Tribal Governments

The BLM has initiated consultation with Indian Tribes, pursuant to:

- Executive Order 13175 of November 6, 2000 (Consultation and Coordination With Indian Tribal Governments)
- Section 106 of the National Historic Preservation Act (NHPA)
- National Environmental Policy Act (NEPA)
- American Indian Religious Freedom Act (AIRFA)
- Executive Order 13007, Indian Sacred Sites
- Programmatic Agreement among federal agencies [1] expanding on larger efforts undertaken by the BLM to consult on renewable energy projects in southern Nevada.

Consultation letters were distributed to the below 15 tribes requesting their respective input on the Project on March 31, 2021, and August 24, 2022:

(1) Big Pine Paiute Tribe of Owens Valley
(2) Bishop Paiute Tribe, Chemehuevi Indian Tribe
(3) Chemehuevi Indian Tribe
(4) Colorado River Indian Tribes
(5) Fort Independence Indian Community of Paiute Tribes
(6) Fort Mojave Indian Tribe
(7) Kaibab Band of Paiute Indians
(8) Las Vegas Paiute Tribe

[1] The federal agencies include the BLM, Nevada State Historic Preservation Officer, Arizona State Historic Preservation Officer, Colorado State Historic Preservation Officer, California, New Mexico State Historic Preservation Officer, Utah State Historic Preservation Officer, and Advisory Council of Historic Preservation.

(9) Moapa Band of Paiutes
(10) Lone Pine Paiute-Shoshone Tribe
(11) Paiute Indian Tribe of Utah
(12) San Juan Southern Paiute Tribe
(13) Timbisha Shoshone Tribe
(14) Twenty-Nine Palms Band of Mission Indians
(15) Utu Utu Gwaitu Paiute Tribe (Owens Valley Paiute Benton Reservation)

Additionally, the BLM invited these 15 tribes to participate as Cooperating Agencies on the Project on July 1, 2022, and August 24, 2022.

To date, Moapa Band of Paiutes, Chemehuevi Indian Tribe, Timbisha Shoshone Tribe, Fort Independence Indian Community of Paiute Indians, and Twenty-Nine Palms Band of Missions Indians have expressed varying levels of interest in the proposed Project. Moapa Band of Paiutes and Timbisha Shoshone Tribe expressed interest in Government-to-Government consultation. The Chemehuevi Indian Tribe, Fort Independence Indian Community of Paiute Indians, and Twenty-Nine Palms Band of Mission Indians expressed interest in informal coordination. The BLM conducted a Government-to-Government meeting with the Las Vegas Paiute Tribe on February 19, 2021 about several projects, including the Rough Hat Clark Solar Project. The Tribe shared that they are not often involved in projects in Nye County but would still like to receive project information. The Fort Independence Reservation shared general interest in Pahrump Valley by phone (March 16, 2023) but would defer to local Tribes and recommended including them to consult if not already invited.

The BLM conducted Government-to-Government meetings with Timbisha Shoshone Tribe on February 15, 2024, and has met with Moapa Band of Paiutes on a recurring basis since 2022. The most recent formal consultation meeting with Moapa Band of Paiutes was June 13, 2024 to discuss several renewable energy projects in Pahrump Valley, and upon request, the BLM shared information to the Moapa Tribal Council by e-mail on July 3, 2024.

The BLM completed an informal coordination meeting with Chemehuevi Indian Tribe on June 18, 2024 and met consistently with Twenty-Nine Palms Band of Missions Indians since 2022. The BLM conducted a field visit with Twenty-Nine Palms Band of Missions Indians on May 26, 2021, with Timbisha Shoshone Tribe on June 4, 2021, and Chemehuevi Indian Tribe on November 3, 2022. While Twenty-Nine Palms Band of Missions Indians expressed interest in informal coordination, the BLM received a letter on December 1, 2023 from the Tribal Historic Preservation Office that states that there are no perceived impacts to tribal resources in the Project area. This perspective is restated during an informal coordination meeting on January 10, 2024.

Prior to scoping, the Paiute Indian Tribe of Utah deferred to local tribes in the Pahrump Valley area. Additionally, the Pahrump Paiute Tribe, a non-federally recognized tribe, was invited to offer comments for Section 106 of the NHPA and NEPA.

The general feedback shared with the BLM is briefly summarized. The Moapa Band of Paiutes' concerns have focused on the protection of cultural and natural resources, long-term impacts, cultural sensitivity training for personnel, and the involvement of the tribe in different aspects of the Project. In addressing the last aspect, the BLM prepared a mitigation measure to be included in the NEPA document that supports the development of a Tribal Participation Plan. On August 8, 2023, the Moapa Band of Paiutes was offered an opportunity to review the language of the mitigation measure. The Timbisha Shoshone and the Twenty-Nine Palms Band of Mission Indians are interested in the protection of the Mojave desert tortoise. Potential impacts to areas of tribal interest are expressed by the Timbisha Shoshone Tribe and Chemehuevi Indian Tribe. Additionally, the Twenty-Nine Palms Band of Mission Indians shared concerns about the long-term impact of the Proposed Action to the environment and interest in the protection of cultural resources.

Additionally, the BLM is working with the Moapa Band of Paiutes as a Cooperating Agency. Through this process, the Moapa Band of Paiutes has reaffirmed the request for tribal participants to be present during construction and cultural sensitivity training for construction crews. The Moapa Band of Paiutes suggested that the BLM consider Traditional Ecological Knowledge in the NEPA analysis, particularly in relation to Spring Mountains and Amargosa Valley. The BLM welcomes any Traditional Ecological Knowledge that the Moapa Band of Paiutes wishes to share but no additional information has been provided at this time. Amargosa Valley is also outside the scope of this Project, but the BLM will consider this feedback for future proposed actions in the Amargosa Valley area. For cultural surveys, shorter in width cultural transects were proposed, but the BLM received this information after the completion of cultural surveys. In general, BLM NV archaeologists follow Nevada State Office guideline that establishes a protocol standard of 30 meters, which can be adjusted on a project-specific basis by the appointed archaeologist if they are informed prior in the initial stages of Section 106 of the NHPA.

As part of on-going consultation, the BLM sent consultation letters to the tribes providing updates on the Project, related to the proposed VRM Amendment area on July 20, 2023, with e-mail follow-up for the letter on August 21, 2023. To address feedback shared about potential visual impacts to tribal resources in Pahrump Valley, the BLM shared a map of KOPs taken for visual assessment with Tribes by e-mail on May 19 and 22, 2023. No specific concerns or comments have been shared with the BLM regarding visual impacts or the additional updates shared by letter. Recently, the BLM shared project updates by e-mail on May 22, 2023, October 23, 2023, February 22, 2024, March 19, 2024, and June 17, 2024, along with an invitation to present these in person by request. No tribes have responded with a request for a presentation.

4.4 Endangered Species Act Section 7 Consultation

BLM's obligations under Section 7 of the ESA include utilizing agency authorities in furtherance of the purposes of the Act by carrying out programs for the conservation of endangered species and threatened species. Relevant actions can include providing up-front exclusion areas and design features to protect and assist in recovery of threatened and endangered species, and early coordination with the USFWS to allow development of appropriate conservation efforts. BLM has coordinated and communicated with the USFWS throughout the NEPA process for the Project, including Cooperating Agency meetings and document reviews, working group meetings, and other coordination meetings prior to formally initiating consultation. As part of on-going communication between federal agencies, the USFWS was invited to review internal documents that preceded publication of the Draft RMPA/EIS. Information received from the USFWS, including recommended conservation measures, has been incorporated into the RMPA/EIS. Additionally, the BLM prepared a Biological Assessment (BA) to evaluate the potential impacts of the Project on species listed as threatened or endangered under the ESA and on designated critical habitats within the Project area. The BLM submitted the BA to the USFWS to initiate formal Section 7 consultation on January 12, 2024. The USFWS signed the Biological Opinion on June 10, 2024 and the formal Section 7 consultation is complete.

4.5 National Historic Preservation Act Section 106 Consultation

Section 106 of the National Historic Preservation Act of 1966 (54 USC § 306108) (NHPA) requires that all Federal agencies take into account the effects of undertakings they carry out, license, approve, or fund on historic properties, and to provide the Advisory Council on Historic Preservation (ACHP) an opportunity to comment. Specifically, the regulations at 36 CFR 800.8(c), allow a Federal agency to use the NEPA environmental review process to comply with Section 106 of the NHPA in lieu of the procedures set forth in 36 CFR 800.3 - 800.6.

The BLM is using the environmental review process to fulfill its requirements to consider effects to historic properties under Section 106 of the NHPA. As part of the process, the BLM has notified the ACHP, the Nevada State Historic Preservation Office (SHPO), Indian tribes, the Old Spanish Trail Association, and the Pahrump Paiute Tribe that the BLM will use the environmental review process to meet its Section 106 compliance requirements, consistent with 36 CFR 800.8(c).

The BLM initiated Section 106 consultation and notified the ACHP of its intent to use the NEPA Substitution Process identified in 36 CFR 800.8(c) to meet its Section 106 compliance requirements, on March 3, 2022. The BLM received two comment letters from ACHP. The first ACHP letter, received March 18, 2022, stated that the BLM must meet the standards in 36 CFR §§ 800(c)(1)(i) through (v) and notify the SHPO regarding BLM’s decision to comply with Section 106 of the National Historic Preservation Act via the NEPA Process. The ACHP also stated that they will determine whether they will participate in the Section 106 consultation after they have had an opportunity to review the DEIS and BLM effects determinations.

The BLM initiated Section 106 consultation and notified the SHPO of its intent to use the NEPA Substitution Process identified in 36 CFR 800.8(c) to meet its Section 106 compliance requirements on April 7, 2021. This letter also included the Agency defined area of potential effects (APE) and Agency proposed identification and evaluation efforts to identify potential impacts of the proposed Project to Historic Properties for consultation.

The SHPO responded by letter dated May 11, 2021, and provided several recommendations regarding the APE for the proposed Project and requested additional maps and information regarding the APE.

The BLM provided to SHPO the results of identification and evaluation efforts for the proposed Project, the BLM proposed determinations of eligibility, and requested concurrence on these determinations by letter dated November 28, 2022. On December 30, 2022, SHPO provided a response that included concurrence with BLM determinations of not eligible for 5 resources identified within the physical APE. The SHPO did not concur with the BLM determination of not eligible for an additional 17 resources and requested additional information to support these determinations. SHPO also provided additional comments for the BLM to consider in its analysis efforts for visual, auditory, and atmospheric effects.

On June 15, 2023, the BLM provided the additional information requested by SHPO and again requested their concurrence on the eligibility of the remaining 17 resources within the physical APE. This letter also included a summary of the analysis of effect presented in the Administrative Draft EIS (ADEIS), as well as a copy of the ADEIS for SHPO review, the Agency findings of effect under Section 106, and a request for concurrence on this finding. The SHPO provided a comment on the Draft RMPA/EIS on April 11, 2024. The BLM responded to the SHPO comments in the Final RMPA/EIS and provided supplemental information to the SHPO based on their comment as described in Appendix G of the Final RMPA/EIS.

The BLM identified and invited 15 federally recognized Indian tribes to participate in the Section 106 consultation on the proposed Project by letters dated July 1 and August 24, 2022. These initial notifications included a notification of the BLM’s intent to use the NEPA Substitution Process identified in 36 CFR 800.8(c) to meet its Section 106 compliance requirements, and request for any information that the tribes could provide regarding places of cultural or religious significance that should be considered in the review. A full summary of this consultation is provided in Section 4.3 above.

The BLM has also identified and invited the Pahrump Paiute Tribe (a non-federally recognized tribe located in the Pahrump Valley) and the Old Spanish Trail Association (OSTA) to participate in the consultation for the proposed Project by letters dated March 28, 2023. The OSTA accepted consulting party status and requested a meeting with the BLM in a letter dated May 5, 2023. The BLM met with OSTA, visited the proposed Project site, and discussed the trail and the OSTA's concerns with the proposed Project on June 30, 2023. Both the OSTA and the Pahrump Paiute Tribe will be notified of the release of the DEIS and invited to review. The BLM is using the DEIS comment period to solicit input of the consulting parties and the public on eligibility and effects determinations, consistent with 36 CFR 800.8(c).

The BLM also invited the ACHP, SHPO, and Indian tribes to participate in the NEPA process as Cooperating Agencies in June 2022. On June 21, 2022, BLM received a response from ACHP declining to be a Cooperating Agency. Along with other Cooperating Agencies, the SHPO received an administrative draft of the Draft EIS/RMPA on June 15, 2023. The BLM developed this DEIS consistent with the standards set forth in 36 CFR 800.8(c)(1)(i)-(v) and will continue to take the necessary steps to complete the requirements outlined in 36 CFR 800.8(c).

4.6 U.S. Army Corps of Engineers Section 404 Permit

The Applicant is requesting a general permit under Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers. The Applicant submitted the preliminary jurisdictional delineation report to the U.S. Army Corps of Engineers in early February 2023. The Applicant received a letter from the USACE on November 22, 2023 concluding that all identified aquatic features on the Project site are not waters of the U.S. regulated under Section 404 of the Clean Water Act.

4.7 Cooperating Agency Coordination

In June 2022, the BLM invited 26 federal, state, and local agencies to become Cooperating Agencies for the Project. The BLM also invited 15 Indian tribes to participate as Cooperating Agencies for the Project. A detailed list of those agencies and Tribes invited is included below.

Federal

Advisory Council on Historic Preservation

Bureau of Indian Affairs – Western Regional Office

U.S. Department of Defense, Nevada Test and Training Range

U.S. Environmental Protection Agency – Region 9

Military Aviation and Installation Assurance Siting Clearinghouse

National Parks Service – Interior Regions 8, 9, 10, and 12

U.S. Army Corps of Engineers – Nevada/Utah Regulatory Section

U.S. Fish and Wildlife Service – Southern Nevada District Office, Ecological Services Program; Reno Fish and Wildlife Office; and Migratory Bird Program

State of Nevada

Nevada Department of Public Safety

Nevada Department of Transportation

Nevada Department of Wildlife – Southern Region

Nevada Department of Conservation and Natural Resources – Off-Highway Vehicles Program

Nevada Division of Forestry

Nevada Division of Environmental Protection

Nevada Division of Water Resources

Nevada Division of State Parks

Nevada Division of State Lands

Nevada Division of Emergency Management

Nevada Governor's Office of Energy

Nevada State Historic Preservation Office

Public Utilities Commission of Nevada

U.S. Forest Service, Spring Mountain National Recreational Area

U.S. Bureau of Reclamation – Interior Regional 8-Lower Colorado Regional Office

Local agencies

Clark County Department of Environment and Sustainability

Clark County Department of Aviation

Nye County

Tribal governments

Big Pine Paiute Tribe of the Owens Valley

Bishop Paiute Tribe

Chemehuevi Indian Tribe

Colorado River Indian Tribe

Fort Independence Indian Community of Paiute Tribes

Fort Mohave Indian Tribe

Kaibab Band of Paiute Indians

Las Vegas Paiute Tribe

Lone Pine Paiute-Shoshone Tribe

Moapa Band of Paiutes

Paiute Indian Tribe of Utah

San Juan Southern Paiute Tribe

Timbisha Shoshone Tribe

Twenty-nine Palms Band of Mission Indians

Utu Utu Gwaitu Paiute Tribe

The Cooperating Agencies that accepted invitation to participate include the following:

(1) United States Fish and Wildlife Service Ecological Services Program
(2) United States Fish and Wildlife Service Migratory Bird Program
(3) USEPA Region 9, Nevada Division of Emergency Management
(4) Nevada Department of Public Safety
(5) Nevada Department of Wildlife
(6) Nevada Division of Forestry
(7) Nevada Division of Emergency Management
(8) Clark County Department of Environment and Sustainability
(9) Clark County Department of Aviation
(10) Nye County
(11) Moapa Band of Paiutes.

The BLM conducted a Cooperating Agency kick-off meeting for the Project, as well as additional meetings on alternatives for the Proposed Action, to gather input from the Agencies for the NEPA analysis. The Cooperating Agencies also participated in review of administrative draft documents for the EIS, as well as review of resource reports, studies, and modeling utilized for the NEPA analysis.

The BLM provided notification of the publication of the Draft RMPA/EIS to the 10 federal, 13 state, 3 local agencies and the 15 tribal governments that were invited to participate as Cooperating Agencies, listed above, including a link to the document location.

4.8 Next Steps in the Planning Process

Upon receipt and consideration of the public comments on the Draft RMPA/EIS, the BLM published the Proposed RMPA/Final EIS. Publication of the Proposed RMPA/Final EIS commences a 30-day protest period and 60-day Governor's Consistency Review period regarding the land use planning decisions proposed in the Proposed RMPA/Final EIS. Upon resolution of public protests and comments from the Governor, the BLM would then publish the ROD and, potentially, authorize the ROW application. The ROD would identify the selected alternative for the Project.