U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Esmeralda 7 Solar Project

Draft Programmatic Environmental Impact Statement and Resource Management Plan Amendment

July 2024

DOI-BLM-NV-B000-2022-0002-RMP-EIS

Prepared by:
U.S. Department of the Interior
Bureau of Land Management

In Cooperation with:
Esmeralda County
Moapa Band of Paiutes
Nevada Department of Wildlife
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

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

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Battle Mountain District
50 Bastian Road
Battle Mountain, NV 89820

July 26, 2024

In Reply Refer To:
2800 (LLNVB00000)
N-100222, N-100223, N-100357, N-100358, N-100361, N-100397, and N-100398
DOI-BLM-NV-B000-2022-0002-RMP-EIS

Dear Reader:

Below is the Esmeralda 7 Solar Project Draft Programmatic Environmental Impact Statement (PEIS) and Resource Management Plan Amendment (RMPA). The Bureau of Land Management (BLM), Battle Mountain District Office prepared the Draft PEIS/RMPA to evaluate amending the Tonopah Resource Management Plan (RMP) and potential solar development on BLM-administered lands in Esmeralda County, Nevada.

Seven projects have pending right-of-way applications before the BLM: Lone Mountain Solar, Nivloc Solar, Smoky Valley Solar, Red Ridge 1 Solar, Red Ridge 2 Solar, Esmeralda Energy Center, and Gold Dust Solar. The seven proposed facilities would be geographically contiguous and encompass approximately 62,300 acres of BLM-administered lands approximately 30 miles west of Tonopah, Nevada.

The BLM encourages the public to provide information and comments pertaining to the analysis presented in the Draft PEIS/RMPA. We are interested in any new information that would help the BLM as it develops the Proposed RMPA/Final PEIS. The BLM will accept comments on the Draft PEIS/RMPA for ninety (90) calendar days following the Environmental Protection Agency's publication of a Notice of Availability of the Draft PEIS/RMPA in the *Federal Register*. The BLM must receive comments by October 24, 2024.

The BLM can best use your comments and resource information submissions if received within the review period.

Electronic comments may be submitted electronically via the project email address: BLM_NV_BMDO_P&EC_NEPA@BLM.gov or the ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2020804/510. You also may hand deliver hard copy comments to the BLM Battle Mountain District Office during business hours Monday-Friday or mail them to: ATTN: Esmeralda 7 Project Manager, BLM Battle Mountain District, 50 Bastian Road, Battle Mountain, NV 89820. To facilitate analysis of comments and information submitted, we strongly encourage you to submit comments in an electronic format via the ePlanning website.

Your review and comments on the content of this document are critical to the success of this planning effort. Comments will be more helpful if they include suggested changes, sources, or methodologies, and reference to a section or page number. The BLM will consider and include comments containing only opinion or preferences as part of the decision-making process, although they will not receive a formal response from the BLM.

Before including your address, phone number, email address, or other personal identifying information in your comment, be advised that your entire comment—including your personal identifying information—may be made publicly available at any time. While 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 plans to host virtual and in-person public meetings during the 90-day comment period. The specific dates and times for these meetings will be announced at least 15 days in advance on the ePlanning website.

For more information, please contact the BLM Project Manager, Scott Distel, at 775-635-4000.

Sincerely,

DALTREY BALMER
Digitally signed by DALTREY BALMER
Date: 2024.07.19 11:41:02 -07'00'

Daltrey J. Balmer
Tonopah Field Office Manager

Esmeralda 7 Draft Programmatic Environmental Impact Statement and Resource Management Plan Amendment

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

2. Type of Action: Administrative (X) Legislative ( )

3. Document Status: Draft (X) Final ( )

Abstract: The Bureau of Land Management (BLM), Battle Mountain District Office prepared the Draft PEIS/RMPA to evaluate amending the Tonopah Resource Management Plan (RMP) and potential solar development on BLM-administered lands in Esmeralda County, Nevada.

Seven projects have pending right-of-way (ROW) applications before the BLM: Lone Mountain Solar, Nivloc Solar, Smoky Valley Solar, Red Ridge 1 Solar, Red Ridge 2 Solar, Esmeralda Energy Center, and Gold Dust Solar. The seven proposed facilities would be geographically contiguous and encompass approximately 62,300 acres of BLM-administered lands approximately 30 miles west of Tonopah, Nevada.

Under **Alternative A**, the Proposed Action, there would be the potential for up to 62,300 acres of solar development within the seven project areas currently proposed within the planning area. **Alternative B**, the Soils and Vegetation Conservation Alternative (BLM-preferred alternative), would be the same as the Proposed Action, but there would be no amendment to the Tonopah RMP to change the slope requirement for the planning area to a maximum of 10 percent, however, the visual resource amendment would apply as described under the Proposed Action. In addition, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Applicants would use mowing in the rest of the development area to leave vegetation intact. Under **Alternative C**, the No Action Alternative, the BLM would not amend its RMP, future development could be constrained by the existing visual resource management classifications or slope requirements.

The review period on the Draft PEIS/RMPA is 90 calendar days. The review period began when the Environmental Protection Agency published a Notice of Availability in the *Federal Register*.

4. For further information, contact the following:

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BLM Battle Mountain District Office
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Battle Mountain, NV 89820
775-635-4000

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ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2020804/510

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Acronyms and Abbreviations

Acronym or Abbreviation	Full Phrase
AADT	average annual daily traffic
AC	alternating current
ACHP	Advisory Council on Historic Preservation
AF	acre-feet
AFY	acre-feet per year
APE	area of potential effects
AUM	animal unit month
BCC	bird of conservation concern
BCR	bird conservation region
BESS	battery energy storage systems
bgs	below the ground surface
BLM	Bureau of Land Management
BMP	best management practice
CESA	cumulative effects study area
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRMMP	Cultural Resources Management and Mitigation Plan
dB	decibels
dBA	A-weighted decibels
EJ	environmental justice
EIS	environmental impact statement
EMPS	Environmental Management and Planning Solutions LLC
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FLPMA	Federal Land Policy Management Act of 1976
gen-tie	electric generation intertie
GHG	greenhouse gas
GIS	geographic information systems
GW	gigawatt
HAP	hazardous air pollutant
HPSA	health professional shortage area
HUC	hydrologic unit code
IM	Instruction Memorandum
IMPLAN	IMPLAN Group, LLC
IPaC	Information for Planning and Consultation

KOP	key observation point
kV	kilovolt
MLB	Management of Land Boundaries
MOA	memorandum of agreement
MW	megawatt
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NOI	Notice of Intent
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NV	Nevada
OHV	off-highway vehicle
O&M	operations and maintenance
PEIS	programmatic environmental impact statement
PFYC	potential fossil yield classification
PLSS	Public Land Survey System
PLSSDS	Public Lands Survey System Dataset
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
PV	photovoltaic
RCRA	Resource Conservation and Recovery Act
RMP	resource management plan
RMPA	resource management plan amendment
ROD	Record of Decision
ROW	right-of-way
SC-GHG	social cost of greenhouse gas
SEZ	solar energy zone
SF_6	sulfur hexafluoride
SHPO	State Historic Preservation Office
SO_2	sulfur dioxide
Solar RMPA	Approved Resource Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States
SR	State Route
SRP	special recreation permit
SSA	socioeconomic study area
SWReGAP	US Geological Survey Southwest Regional Gap Analysis Project
TCP	traditional cultural property
tpy	tons per year

US	United States
USFWS	United States Fish and Wildlife Service
$\mu g/m^3$	micrograms per cubic meter air
USACE	US Army Corps of Engineers
VRM	visual resource management
WEAP	worker education and awareness plan
WEG	wind erodibility group
WOTUS	waters of the United States

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Executive Summary

ES.1 Introduction

The United States (US) Department of the Interior, Bureau of Land Management (BLM), Battle Mountain District Office is preparing this programmatic environmental impact statement (PEIS) and resource management plan amendment (RMPA) to evaluate amending the Tonopah RMP (BLM 1997) and potential solar development on BLM-administered lands in Esmeralda County, Nevada. Seven projects have pending right-of-way (ROW) applications before the BLM: Lone Mountain Solar, Nivloc Solar, Smoky Valley Solar, Red Ridge 1 Solar, Red Ridge 2 Solar, Esmeralda Energy Center, and Gold Dust Solar. The seven proposed facilities would be geographically contiguous and encompass approximately 62,300 acres of BLM-administered lands approximately 30 miles west of Tonopah, Nevada (**Figure 1-1**, Planning Area, **Appendix A**).

These solar energy–generation and battery energy storage projects, and the associated components, would help meet Nevada's growing demand for power and help fulfill national and State renewable energy and greenhouse gas (GHG) emissions goals. Solar energy provides a sustainable, renewable source of power that helps reduce fossil fuel dependence and GHG emissions. If approved and authorized for construction, facilities would apply for power purchase agreements with the intent to connect to the proposed 525-kilovolt (kV) Esmeralda Substation that would be constructed as part of the separate Greenlink West transmission project.

To assess amending the Tonopah Resource Management Plan (RMP), the PEIS/RMPA analyzes the potential impacts associated with the construction, operations and maintenance (O&M), and decommissioning of the seven utility-scale photovoltaic (PV) solar facilities with battery energy storage systems (BESS) proposed by US Solar Assets LLC, Nivloc Solar Energy LLC, CG Western Renewables III LLC, 335ES 8me LLC, 336SP 8me LLC, and Boulevard Associates LLC. Portions of the proposed Esmeralda 7 operations would not be in conformance with certain planning decisions in the Tonopah RMP (BLM 1997), as amended by the Approved Resource Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States (BLM 2012)(Solar RMPA). Potential amendments to the RMP would modify the visual resources management (VRM) class objectives and update the exclusion area criteria to allow utility-scale development on lands with slopes greater than 5 percent to a maximum of 10 percent.

Through the PEIS/RMPA, the BLM can establish programmatic design features and mitigation measures for the planning area. The RMPA would not approve or deny any individual applications for ROW grants. Rather, the BLM would conduct additional environmental analysis in a separate decision-making process regarding whether to approve, approve with modifications, or deny these applications.

ES.2 Purpose of and Need for the Action

The BLM's purpose for this federal action is to amend the visual and slope management direction in the Tonopah RMP in compliance with the Federal Land Policy and Management Act (FLPMA).

The need for this action is to fulfill the BLM's responsibility under the FLPMA and the BLM's ROW regulations to manage public lands for multiple uses, including the generation and transmission of electric energy, and to consider the long-term needs of future generations for renewable and nonrenewable resources in the Tonopah RMP planning area.

ES.3 Decision to Be Made

The BLM will decide whether to amend the Tonopah RMP (BLM 1997), as amended by the Solar RMPA, to facilitate solar development in the planning area. If approved, the BLM would assist in addressing the management objectives in Secretarial Order 3285A1 (March 11, 2009, as amended on February 22, 2010), which established the development of environmentally responsible renewable energy as a priority for the Department of the Interior. The BLM would not approve or deny any specific proposed ROWs to construct, operate and maintain, or decommission solar-generation and storage facilities.

ES.4 Alternatives

ES.4.1 Alternative A. Proposed Action

Under Alternative A, the Proposed Action, there would be the potential for up to 62,300 acres of solar development within the seven project areas currently proposed within the planning area (**Figure 1-1**, Planning Area, **Appendix A**). The proposed projects include the development of PV solar facilities, including solar arrays, energy storage, roads, and electric generation intertie lines, within the seven solar ROWs, as outlined in each project's plan of development.

Table ES-1 provides a summary overview of each project. Because the project designs vary and will be refined prior to final environmental analysis and decisions for each project , the Proposed Action is based on standard PV facility designs, construction, O&M, and decommissioning. The descriptions of standard methods are outlined in the Supplemental Information Report (BLM 2024).

Table ES-1. Summary of Each Project in the Planning Area

Applicant	Project	Description*
US Solar Assets LLC	Lone Mountain Solar	1-gigawatt (GW) PV facility and 500-megawatt battery storage system; 8,350 acres
Nivloc Solar Energy LLC	Nivloc Solar	500-megawatt PV facility and battery storage system; 8,280 acres
CG Western Renewables III LLC	Smoky Valley Solar	1 GW PV facility and battery storage system; 4,890 acres
335ES 8me LLC 336SP 8me LLC	Red Ridge 1 Solar Red Ridge 2 Solar	600-megawatt PV facility and battery storage system for each; 6,190 acres for Red Ridge 1 Solar and 6,860 acres for Red Ridge 2 Solar
Boulevard Associates LLC	Esmeralda Energy Center	1 GW PV facility and battery storage system; 8,360 acres
Gold Dust Solar LLC	Gold Dust Solar	1.5 GW PV facility and 1 GW battery storage system; 16,720 acres

Sources: 335ES 8me LLC 2021; 336SP 8me LLC 2021; Boulevard Associates LLC 2021; CG Western Renewables III LLC 2021; Gold Dust Solar LLC 2021; Nivloc Solar Energy LLC 2021; US Solar Assets 2021. Additional/updated estimates were submitted to the BLM by project applicants in July 2023.
*Source for project area/ROW acres: BLM GIS 2023.
Note: Some of the ROW acres were adjusted to deduct areas that overlap the proposed Greenlink West corridor or Highways 95 and 6.

Proposed Disturbance

Based on existing information regarding the proposed solar facilities, the total amount of disturbance and resources associated with the combined developments are summarized in the PEIS in **Section 2.1**.

Construction

Construction of the facilities would include site preparation and stabilization, temporary use areas, gravel and aggregate materials, water sources and storage, dust and stormwater control, and reclamation in temporary disturbance areas. These are described in **Section 2.1**. The workforce sizes and schedules, typical construction equipment, and construction sequencing and methods for the PV solar arrays, electrical collection and transmission systems, and substations are also described in **Section 2.1**.

The timelines for construction would vary by project with estimates of 18 to 36 months. The timing of project approvals and the availability of the construction contractors and workforce would also differ by project. It is assumed that full buildout of all projects could be completed within 5 years from the Record of Decision (ROD) for the PEIS/RMPA. Based on the 5-year buildout and assuming all projects are approved and initiate development, 845 workforce personnel could be anticipated within the planning area at any given time.

Operations and Maintenance

O&M, including inspections, water use, workforce, and hazardous materials and emergency response, are described in the PEIS/RMPA in **Section 2.1**.

Decommissioning and Reclamation

Decommissioning of a facility after its life and reclamation are described in the PEIS/RMPA in **Section 2.1**.

Anticipated Programmatic Design Features

Programmatic design features would be applied to protect resources from possible impacts associated with solar development. A full list of programmatic design features can be found in the PEIS/RMPA, **Appendix B**.

Proposed Applicant-Committed Environmental Protection Measures

The plans of development for the seven proposed solar projects vary with regard to proposed applicant-committed environmental protection measures. The environmental protection measures would be refined during the project-specific NEPA analysis. A list of typical environmental protection measures taken from the plans of development include the following:

- Standard best management practices to minimize impacts on soil resources, air, water quality, and vegetation would be implemented.
- Standard best management practices and weed control measures would be implemented.
- Standard dust-control measures, such as watering access roads, and fire protection measures would be implemented.
- Class III cultural resources surveys and reporting would be completed.
- Cultural resources or historic properties treatment plans would be developed.
- If construction occurs in proximity to a cultural resource site that is eligible for the National Register of Historic Places, an authorized cultural monitor would be on-site during the activity.

- Migratory bird surveys would be conducted. Construction in or near migratory bird habitat would be avoided during the breeding season; or, an authorized biologist would identify and flag nests, and construction would avoid the nest and buffer zone.
- During decommissioning and reclamation of the projects, all disturbed lands would be regraded to the approximate original contour, topsoil would be placed, and the areas would be revegetated.

Management plans and programs that may also be developed including the following:

- Avian protection plan
- Conduct standards for boundary evidence risk assessments for project area boundaries
- Decommissioning and site restoration plan
- Dust-control plan
- Emergency response plan
- Environmental compliance plan
- Fire prevention and management plan
- Hazardous materials plan
- Health and safety plan
- Integrated weed management plan
- Lighting management plan
- Marking Public Land Survey System (PLSS) and mineral survey markers
- Pesticide use plan
- Site drainage plan
- Spill prevention and emergency response plan
- Stormwater pollution prevention plan
- Erosion and sediment control plan/water quality control plan
- Transportation and traffic management plan
- Worker environmental awareness program

ES.4.2 Alternative B. Soils and Vegetation Conservation Alternative

This alternative would be the same as the Proposed Action, but there would be no amendment to the Tonopah RMP to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would be based on the additional slope criteria outlined in the Solar RMPA (BLM 2012; see below). In addition, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Applicants would use mowing in the rest of the development area to leave vegetation intact. In mowed areas, vegetation would be mowed to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters), where justified.

According to the 2012 Solar RMPA, applications may include some lands with up to 10 percent slope where higher slope inclusions meet all of the following: (1) they are proximate to variance lands in the application, (2) they are not otherwise excluded from development, (3) they allow for the avoidance or minimization of resource conflicts, and (4) they do not create any significant new or additional conflicts.

In such cases, a land use plan amendment would not have to be adopted as part of the project-specific analysis to permit the slope exception.

ES.4.3 Alternative C. No Action Alternative

Under Alternative C, the No Action Alternative, the BLM would not amend its RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements.

Seven alternatives were considered but dismissed from detailed analysis in the PEIS/RMPA. These alternatives are summarized in the PEIS/RMPA (**Table 2-3**).

ES.5 Summary of Environmental Consequences

To avoid, minimize, or otherwise mitigate impacts on resources from the seven solar projects, the applicants have committed to environmental protection measures (see **Appendix B**). In addition, all the solar projects would be subject to the design features outlined in the Solar RMPA (BLM 2012), along with relevant best management practices and applicable requirements from BLM manuals, handbooks, and regulations. The design features are considered in the impact analysis for each resource and use. The design features are included in the PEIS/RMPA in **Appendix B** and would apply to all the action alternatives. The PEIS/RMPA analyzes the effects of each alternative (see **Chapter 4**) and includes a comparison of effects by alternative (see **Table 2-4**).

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Chapter 1. Introduction

1.1 INTRODUCTION AND GENERAL INFORMATION

The United States (US) Department of the Interior, Bureau of Land Management (BLM), Battle Mountain District Office is preparing a programmatic environmental impact statement (PEIS) and resource management plan amendment (RMPA) to evaluate amending the Tonopah RMP (BLM 1997) and potential solar development on BLM-administered lands in Esmeralda County, Nevada. The seven proposed facilities would be geographically contiguous and encompass approximately 62,300 acres of BLM-administered lands approximately 30 miles west of Tonopah, Nevada (**Figure 1-1**, Planning Area, **Appendix A**).

To assess amending the Tonopah Resource Management Plan (RMP), the PEIS/RMPA analyzes the potential impacts associated with the construction, operations and maintenance (O&M), and decommissioning of the seven utility-scale photovoltaic (PV) solar facilities with battery energy storage systems (BESS) proposed by US Solar Assets LLC, Nivloc Solar Energy LLC, CG Western Renewables III LLC, 335ES 8me LLC, 336SP 8me LLC, and Boulevard Associates LLC. Portions of the proposed Esmeralda 7 operations would not be in conformance with certain planning decisions in the Tonopah RMP (BLM 1997), as amended by the Approved Resource Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States (BLM 2012) (Solar RMPA). Potential amendments to the RMP would modify the visual resources management (VRM) class objectives and update the exclusion area criteria to allow utility-scale development on lands with slopes greater than 5 percent to a maximum of 10 percent.

Through the PEIS/RMPA, the BLM can establish programmatic design features and mitigation measures for the planning area. The RMPA would not approve or deny any individual applications for right-of-way (ROW) grants. Rather, the BLM would conduct additional environmental analysis in a separate decision-making process regarding whether to approve, approve with modifications, or deny these applications.

Seven projects have pending ROW applications before the BLM: Lone Mountain Solar, Nivloc Solar, Smoky Valley Solar, Red Ridge 1 Solar, Red Ridge 2 Solar, Esmeralda Energy Center, and Gold Dust Solar. These solar energy–generation and storage projects, and the associated components, would help meet Nevada's growing demand for power and help fulfill national and State renewable energy and greenhouse gas (GHG) emissions goals. Solar energy provides a sustainable, renewable source of power that helps reduce fossil fuel dependence and GHG emissions. If approved and authorized for construction, facilities would apply for power purchase agreements with the intent to connect to the proposed 525-kilovolt (kV) Esmeralda Substation that would be constructed as part of the separate Greenlink West transmission project. The anticipated energy output from the Esmeralda 7 projects and the projects' components are summarized in **Table 2-1**.

The BLM's obligations for the proposed projects are established by regulatory directives and current energy development trends. The BLM decision-making process will incorporate and consider federal policies, including Executive Order 13990 and Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (February 2021), which mandates the federal government to take steps to accelerate clean energy and transmission projects under federal siting and permitting processes in an environmentally sustainable manner. The BLM is preparing this PEIS/RMPA consistent with the revised Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA) regulations

(40 Code of Federal Regulations [CFR] 1500–1508; CEQ 2024). The NEPA process for evaluating the Esmeralda 7 projects began on November 13, 2023, when a Notice of Intent (NOI) to prepare the PEIS/RMPA was published in the *Federal Register*.

1.2 Purpose of and Need for the Action

The BLM's purpose for this federal action is to amend the visual and slope management direction in the Tonopah RMP in compliance with the Federal Land Policy and Management Act (FLPMA).

The need for this action is to fulfill the BLM's responsibility under the FLPMA and the BLM's ROW regulations to manage public lands for multiple uses, including the generation and transmission of electric energy, and to consider the long-term needs of future generations for renewable and nonrenewable resources in the Tonopah RMP planning area.

1.3 Decision to Be Made

The BLM will decide whether to amend the Tonopah RMP (BLM 1997), as amended by the Solar RMPA, to facilitate solar development in the planning area. If approved, the BLM would assist in addressing the management objectives in Secretarial Order 3285A1 (March 11, 2009, as amended on February 22, 2010), which established the development of environmentally responsible renewable energy as a priority for the Department of the Interior. The BLM would not approve or deny any specific proposed ROWs to construct, operate and maintain, and decommission solar-generation and storage facilities.

1.4 Conformance and Permits

The BLM recognizes the importance of state, tribal, and local plans. Applicable laws, regulations, and policies considered in the development of the PEIS/RMPA, as well as those major authorizing laws, regulations, and applicable permits, are listed below under **Section 1.5**. Implementing any of the projects, which are approved in the future by the BLM, would also require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the projects. Note that the list included under **Section 1.5** is not all inclusive, and the applicants would be responsible for applying for and acquiring permits, as needed.

1.4.1 Land Use Plan Conformance and Resource Management Plan Amendment

Actions approved or authorized by the BLM must conform to the approved land use plans (RMPs) for the lands the BLM administers (43 CFR 1610.5-3). The BLM must consider existing RMPs in the decision to issue a ROW grant, in accordance with 43 CFR 1610.5-5(b). Land use plans—or RMPs—that apply to each BLM field office or district office provide public land and resource management direction. If a proposed project does not conform, the BLM can choose to deny the project, adjust the project to conform to the RMP, or amend the RMP to address the nonconformance (BLM 2005). This PEIS/RMPA addresses possible RMP amendments under the Proposed Action and alternatives (**Section 2.1**). **Chapter 5** provides a clarification on the land use planning process and amendments. Applicable plans that overlap the Esmeralda 7 planning area include the following:

Tonopah Resource Management Plan

The BLM Tonopah Field Office manages public lands within its boundaries under the guidance of the Tonopah RMP, as amended, and Record of Decision (ROD). The Tonopah RMP and ROD include specific management decisions for lands and ROW actions, including the objective to make lands available for community expansion and private economic development and to increase the potential for economic diversity (BLM 1997).

Approved Resource Management Plan Amendments/Record of Decision for Solar Energy Development in Six Southwestern States

In 2012, the BLM and the US Department of Energy released the Solar RMPA, sometimes called the Western Solar Plan, and was approved in October 2012. The Solar RMPA facilitated the permitting of solar energy development projects on federal lands in a more efficient, standardized, and environmentally responsible manner. The Solar RMPA established locations well suited for utility-scale production of solar energy, known as solar energy zones (SEZs). It also designated variance areas on federal land outside the SEZs but not otherwise excluded for solar development. The 2012 Solar RMPA amended the 1997 Tonopah RMP to incorporate these land use designations.

The BLM evaluates variance areas on a case-by-case basis. The NEPA analysis includes a review of the proposed projects to ensure they are consistent with the 2012 Solar RMPA and incorporate the relevant design features. A NOI to consider updates to the Solar RMPA was published in the *Federal Register* on December 8, 2022, and the public comment period on the Draft Utility-Scale Solar Energy Development PEIS ended April 18, 2024. Those updates are not complete, so the 2012 RMPA prescriptions are analyzed in this document.

County Plans

The planning area is within Esmeralda County's jurisdictional boundaries.

Esmeralda County developed and adopted a master plan in December 2011 (Esmeralda County 2011). The Esmeralda County Master Plan is policy oriented and general in nature, focusing primarily on the areas in and around the county's community of Goldfield (the county seat). The Esmeralda County Public Lands Policy Plan (Esmeralda County 2013) emphasizes that development of energy resources in the county is desirable, and the county is a prime site for the development of renewable energy. Specifically, plan policies for energy resources include the following:

- Energy production is encouraged as a vital economic component of the Esmeralda County economy. Renewable and alternative resources should be a priority and utilized in a manner that complements other environmental resources. Efforts should be undertaken to ensure a balance between renewable and alternative energy development and the protection of other resources and public access that make the county attractive to citizens and visitors.
- The development and coordinated site determination of renewable and alternative energy generation are encouraged. Coordinated planning is needed to integrate related federal, state, and local planning documents and processes, and to expedite the permitting and evaluations needed for project approvals.
- The development of corridors for energy transmission and distribution is encouraged. Coordinated planning is needed to integrate related federal, state, and local planning documents and processes, and to expedite obtaining the permits and ROWs for the corridors. ROWs should not interfere with public access.

- The county supports state and federal policies that encourage large- and small-scale operations. Regulatory hurdles should be simple so that the economic development of renewable and alternative energy resources is rapid.
- The installation of any utility-scale renewable energy facilities, such as solar thermal and geothermal, that use water (for example, in cooling towers) should take into account available water resources. Water usage should not lower the water table. Where cooling towers are required, only dry cooling towers are acceptable. Wet cooling towers are not acceptable due to their inefficient use of the limited available groundwater resources. Water usage shall employ the most efficient technology available (that is, the minimum use of water to accomplish the necessary function). Even if water rights are available, regardless of the status of allocation versus perennial yield per basin, water usage should be minimized to conserve the limited water resources.
- Renewable and alternative energy producers, transmission and distribution line corridors, and other associated facilities on public or private lands are subject to county sales and property taxes, as approved by the Esmeralda County Board of Commissioners or regulated by state law.

The Esmeralda County Public Lands Policy Plan also includes plan policies to protect and preserve the quality of the environment, wildlife habitat, and economic, cultural, scenic, historical, and archaeological values. Additionally, it includes policies to conserve and protect recreational and open space resources for the benefit of the present and future generations.

Esmeralda County borders Mineral County to the northwest and Nye County to the east. The Mineral County Master Plan (Mineral County 2010) outlines the county's plan for future needs and growth. The Mineral County Master Plan does not provide specific goals for the development of energy resources; however, other goals relevant to this project include:

- Partner with commercial partners for research and development on and off base, training, product manufacturing of the military-related support industry, renewable energy production, and equipment manufacturing.
- Participate and take a position of ownership in all aspects of federal land management in Mineral County from watershed restoration, mining, development of alternative energy sources, and preservation of the land for future generations.

Nye County is Nevada's largest county by area. The Nye County 2011 Comprehensive/Master Plan (Nye County 2011) is meant to guide the county's "growth, management of natural resources, and provision of public services and facilities" and to ensure the public's overall protection (Nye County 2011). Goals relevant to this project include:

- Increase opportunities for local economic development by selectively increasing the amount of privately owned and locally managed land within the county.
- Promote development of mineralized lands and renewable and nonrenewable energy projects, and provide adequate regulation to minimize or eliminate potential adverse impacts associated with project development and operation.
- Maximize the use of freely available alternative energy resources in Nye County (Objective 1 – Promote the use of environmentally responsible alternative energy sources).

- Provide for Nevada's energy needs through coordinated resource planning and management between private enterprise and government to plan for development of energy resources.

It is the responsibility of the project applicants to coordinate with the affected counties to demonstrate compliance with county plans and development code requirements. It is the responsibility of the counties to determine whether the Proposed Action or alternatives comply with the counties' master plan policies and development codes. Per CEQ regulations (40 CFR 1506.2(d)), the PEIS/RMPA should discuss any inconsistency a project may have with any approved state, tribal, or local plan.

1.5 APPLICABLE LAWS, REGULATIONS, AND POLICIES

FLPMA and its implementing regulations provide the legal framework that the BLM uses to manage public lands and assess the effects of its management actions. The BLM is preparing this PEIS/RMPA in compliance with the 2024 CEQ NEPA regulations, Department of the Interior NEPA regulations, and Department of the Interior and BLM policies and manuals, including the BLM NEPA handbook (BLM 2008a). This PEIS/RMPA is subject to requirements for consistency and conformance with other applicable federal laws, regulations, and policies, including the following:

- BLM Handbook H-9600-1, Cadastral Survey Handbook
- BLM Manual 2800 series – Land Resource Management manuals
- BLM Manual 6840, Special Status Species Management
- Clean Air Act (42 US Code [USC] 7401 et seq., as amended)
- Clean Water Act (33 USC 1251 et seq.)
- Endangered Species Act of 1973 (16 USC 1513 et seq.)
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (February 16, 1994)
- Executive Order 13112, Invasive Species (February 3, 1999)
- Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (November 9, 2000)
- Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds (January 10, 2001)
- Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use (May 18, 2010)
- Executive Order 13212, Actions to Expedite Energy-Related Projects (May 18, 2010)
- Executive Order 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (January 25, 2021)
- Executive Order 14008, Tackling the Climate Crisis at Home and Abroad (February 1, 2021)
- Federal Noxious Weed Act of 1974, as amended
- Fish and Wildlife Coordination Act (16 USC 661–667e; March 10, 1934; Chapter 55; 48 Statute 401)
- James M. Inhofe National Defense Authorization Act for Fiscal Year 2023 (House of Representatives 7776)

- BLM Instruction Memorandum [IM] 2021-046, Mitigation Manual MS-1794, Mitigation Handbook H-1794-1
- IM 2023-005, Habitat Connectivity on Public Lands
- IM 2023-043, Assessment, Inventory, and Monitoring (AIM) Data Application to Land Use Plan Effectiveness and NEPA Analysis.
- IM 2023-003, Updated Process for Department of the Interior (DOI) and Bureau of Land Management (BLM) Directorate Briefings and Reviews of National Environmental Policy Act (NEPA) Documents
- IM 2021-026, Use of Competitive Processes for Solar and Wind Energy Development Outside of Designated Leasing Areas
- IM 2019-013, National Policy for Rights-of-Way Bonding
- IM 2017-099, Technical and Financial Evaluations for Solar and Wind Energy Rights-of-Way Grants and Leases
- Bald and Golden Eagle Protection Act of 1940, as amended (16 USC 668–668d)
- USFWS's final rule "Permits for Incidental Take of Eagles and Eagle Nests" (89 *Federal Register* 9920; 50 CFR 13 and 22), April 12, 2024
- IM 2017-040, Bald and Golden Eagle Protection Act- Eagle Incidental Take Permit Guidance for Renewable Energy Development
- IM 2011-181, Involvement of Grazing Permittee/Lessee with Solar and Wind Energy Right-of-Way Application Process
- 600 Departmental Manual 5 – Standards for Federal Lands Boundary Evidence
- Migratory Bird Treaty Act of 1918 (16 USC 703–711)
- NEPA revised regulations by the CEQ (40 CFR 1500–1508, May 1, 2024)
- National Historic Preservation Act of 1966 (NHPA; 54 USC 300101 et seq.)
- Presidential memorandum—Federal Leadership on Energy Management (December 2013)
- Presidential memorandum—Modernizing Federal Infrastructure Review and Permitting Regulations, Policies, and Procedures (May 2013)
- Presidential memorandum—Transforming Our Nation's Electric Grid Through Improved Siting, Permitting, and Review (June 2013)
- Presidential memorandum—Consultation and Strengthening Nation-to-Nation Relationships (January 26, 2021)
- Rights-of-way, Leasing, and Operations for Renewable Energy Final Rule (May 2024)
- Secretarial Order 3175, Departmental Responsibilities for Indian Trust Resources
- Secretarial Order 3285A1 (amended February 22, 2010), Renewable Energy Development by the Department of the Interior
- The Energy Act of 2020

1.6 Issues and Comments

Section 6.6 describes the public engagement for this project including a public scoping process which kicked off the NEPA process and included two public meetings in November 2023. Issues identified during public scoping were documented in the scoping report (BLM 2024a). The issues relevant to the NEPA analysis are identified in **Table 1-1**.

Table 1-1. Issues Identified during Public Scoping

How will the BLM ensure this PEIS/RMPA conforms with other regional planning and project environmental compliance documents?
How will the proposed RMP amendments affect visual and soil resources in the planning area?
Which direct and indirect impacts will the BLM analyze in the PEIS/RMPA?
Which past, present, and reasonably foreseeable future actions will the BLM analyze in the PEIS/RMPA?
What project design features would the BLM implement, and how would existing design features and best management practices (BMPs) from similar BLM projects be incorporated?
How will the BLM comply with Section 106 of the NHPA?
What emissions would occur from construction and operations activities, and how would the emissions be mitigated?
How will the effects of climate change impact the planning area, and how would the projects' components be designed to address potential climate change–related impacts?
How would dust emissions be monitored?
How would the proposed projects affect the nominated Esmeralda/Fish Lake Area of Critical Environmental Concern (ACEC)?
How would the proposed projects affect biological resources?
What are the potential effects from invasive vegetation, and how would the invasive species be monitored and controlled?
How would the projects affect avian species, and what measures would be taken to prevent avian mortalities?
How would the proposed projects affect rare plants and endemic species?
Which listed threatened and endangered species and associated critical habitat exist within the planning area? How would the projects affect these species, and how would the impacts be avoided or minimized?
Which special status species exist within the planning area? How would the projects affect these species, and how would the impacts be avoided or minimized?
How would construction activities affect vegetation, and how would vegetation habitat be restored?
How would chemical treatments be used to control invasive species?
How would the proposed projects affect wildlife species, habitat, and migratory corridors? How would the associated impacts be avoided or minimized?
What is the extent of cultural resources in the planning area, and how would the BLM protect cultural sites?
How would the project components be designed to reduce potential flooding impacts?
How would the proposed projects affect desert washes and ephemeral drainages?
What impaired waters are in the planning area, and how would these waters be affected? How would the associated impacts be avoided or minimized?
What amounts of water would be needed during the proposed projects' construction, operation, and maintenance phases?
Would the projects use both groundwater and surface water?
How would the proposed projects affect waters of the US?
How would the proposed projects affect available material sites and exploration and development of mining claims for minerals such as lithium?
How would the tectonic activity in the area affect the proposed projects?
How many acres of the proposed projects would overlap identified lands with wilderness characteristics?
How would implementing the proposed projects impact lands with wilderness characteristics?
Which paleontological resources exist within and adjacent to the proposed projects?

How would the proposed projects impact grazing permit holders?
How would the proposed projects affect opportunities for recreation, such as dispersed camping, hiking, and motorized travel?
How would the proposed projects affect the demand for housing and services near the planning area?
How would the proposed projects disproportionately impact environmental justice (EJ) communities near the planning area?
How would soils be impacted from construction, operations, and maintenance of the proposed projects?
Where are cryptobiotic soil crusts found in the planning area?
How would the proposed projects limit access to the general public?
Would ground disturbance release fungal spores that could create public health and safety concerns?
How would the proposed projects affect the scenic quality in the planning area, and which VRM classifications would the BLM consider changing in an amendment to the Tonopah RMP?
How much lighting would be needed for the proposed projects, and how would the BLM reduce the potential for impacts on night skies?
What types of waste and materials would be generated and used within the planning area?

Source: BLM 2024a

Chapter 2. Alternatives

2.1 Alternative A. Proposed Action

Under Alternative A, the BLM would amend the visual and slope management direction in the Tonopah RMP (BLM 1997). Analysis of the Proposed Action is based on the potential for up to 62,300 acres of solar development within the seven project areas currently proposed within the planning area (**Figure 1-1**, Planning Area, **Appendix A**). The proposed projects include the development of PV solar facilities, including solar arrays, energy storage, roads, and electric generation intertie (gen-tie) lines, within the seven solar ROWs, as outlined in each project's plan of development. Potential amendments to the Tonopah RMP would modify the VRM class objectives. However, portions of the Esmeralda 7 operations would not conform to the Solar RMPA (BLM 2012), which amended the Tonopah RMP (BLM 1997) and limits the siting of solar panels to lands with slopes that are 5 percent or less.

Table 2-1, below, provides a summary overview of each proposed project. Because the project designs vary and will be refined prior to final environmental analysis and decisions for each project, the Proposed Action is based on standard PV facility designs, construction, O&M, and decommissioning. The description of standard methods is outlined in Appendix A, Reasonably Foreseeable Development Scenario, of the Supplemental Information Report (BLM 2024b).

Table 2-1. Summary of Each Project in the Planning Area

Applicant	Project	Description*
US Solar Assets LLC	Lone Mountain Solar	1-gigawatt (GW) PV and 500-megawatt (MW) battery storage system; 8,350 acres
Nivloc Solar Energy LLC	Nivloc Solar	500 MW PV and battery storage system; 8,280 acres
CG Western Renewables III LLC	Smoky Valley Solar	1 GW PV and battery storage system; 4,890 acres
335ES 8me LLC 336SP 8me LLC	Red Ridge 1 Solar Red Ridge 2 Solar	600 MW PV and battery storage system; 6,190 and 6,860 acres, respectively
Boulevard Associates LLC	Esmeralda Energy Center	1 GW PV and battery storage system; 8,360 acres
Gold Dust Solar LLC	Gold Dust Solar	1.5 GW PV and 1 GW battery storage system; 16,720 acres

Sources: 335ES 8me LLC 2021; 336SP 8me LLC 2021; Boulevard Associates LLC 2021; CG Western Renewables III LLC 2021; Gold Dust Solar LLC 2021; Nivloc Solar Energy LLC 2021; US Solar Assets 2021. Additional/updated estimates were submitted to the BLM by project applicants in July 2023.
*Source for project area/ROW acres: BLM GIS 2023.
Note: Some of the ROW acres were adjusted to deduct areas that overlap the proposed Greenlink West corridor or Highways 95 and 6.

2.1.1 Proposed Facilities

The information presented below is based on preliminary planning for the proposed solar projects making up the Esmeralda 7 projects. The information and details described below may change as plans evolve in response to site-specific NEPA analyses; engineering designs; or changes in company objectives, solar technologies, power market conditions, or other issues not foreseeable at this stage. The timelines for construction would vary by project with estimates of 18 to 36 months. The timing of project approvals and the availability of the construction contractors and workforce would also differ by project. It is assumed that full buildout of all projects could be completed within 5 years from the ROD for the

PEIS/RMPA. Based on the 5-year buildout, and assuming all projects are approved and initiate development, 845 workforce personnel could be anticipated within the planning area at any given time.

Lone Mountain Solar

The Lone Mountain Solar facility would consist of an up to 1 GW alternating current (AC) solar PV power-generation facility and an up to 500 MW BESS on approximately 8,350 acres of BLM-administered lands. Additional ancillary features associated with the Lone Mountain Solar facility would include a direct current collection system, power conditioning system, an on-site substation, meteorological stations, fiber-optic installation, O&M buildings, laydown yards, and site fencing. The proposed development would also include construction of a 230 kV overhead gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line.

Nivloc Solar

The Nivloc Solar facility would consist of an approximately 500 MW AC solar PV energy–generation facility and 500 MW BESS on approximately 8,280 acres of BLM-administered lands. Additional ancillary features associated with the Nivloc Solar facility would include an O&M building, control building, collection system, power conditioning system, on-site substation, water storage tank, drainage control, access roads, site fencing, and laydown areas. The proposed development would also include construction of a 230 kV overhead gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line.

Smoky Valley Solar

The Smoky Valley Solar facility would consist of an approximately 1 GW AC solar PV energy–generation facility and a 1 GW BESS on approximately 4,890 acres of BLM-administered lands. Additional ancillary features associated with the Smoky Valley Solar facility would include an O&M building, inverters and transformers, an on-site substation, a supervisory control and data acquisition system, access roads, site fencing, and laydown areas. The proposed development would also include construction of a 230 kV overhead gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line.

Red Ridge 1 Solar

The Red Ridge 1 Solar facility would consist of an up to 600 MW AC solar PV power-generation facility and 600 MW BESS on approximately 6,190 acres of BLM-administered lands. Additional ancillary features associated with the Red Ridge 1 facility would include access roads, an on-site project substation, collector lines, communication systems infrastructure, fiber-optic installation, O&M buildings, laydown yards, and site fencing. The proposed development would also include construction of a 525 kV single- or double-circuit gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line. Both overhead and underground options are being considered for the gen-tie line.

Red Ridge 2 Solar

The Red Ridge 2 Solar facility would consist of an up to 600 MW AC solar PV power-generation facility and a 600 MW BESS on approximately 6,860 acres of BLM-administered lands. Additional ancillary features associated with the Red Ridge 1 Solar facility would include access roads, an on-site project substation, collector lines, communication systems infrastructure, fiber-optic installation, O&M buildings, laydown yards, and site fencing. The proposed development would also include construction of a 525 kV single- or double-circuit gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line. Both overhead and underground options are being considered for the gen-tie line.

Esmeralda Energy Center

The Esmeralda Energy Center facility would consist of an approximately 1 GW AC solar PV power-generation facility and 1 GW BESS on approximately 8,360 acres of BLM-administered lands. Additional ancillary features associated with the Esmeralda Energy Center would include inverter stations, a supervisory control and data acquisition system, an on-site substation, access roads, site fencing, O&M buildings, laydown areas, and collection lines. The proposed development would also include construction of a 525 kV overhead gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line.

Gold Dust Solar

The Gold Dust Solar facility would consist of an up to 1.5 GW AC solar PV power-generation facility and a 1 GW BESS on approximately 16,720 acres of BLM-administered lands. Additional ancillary features associated with the Gold Dust Solar facility would include a direct current collection system and power conditioning system, an energy storage system, meteorological stations, administrative and maintenance buildings, communication systems infrastructure, drainage control structures, and site fencing. The proposed development would also include construction of a 525 or 345 kV overhead gen-tie transmission line that would connect to the Esmeralda Substation along NV Energy's proposed Greenlink West 525 kV transmission line.

2.1.2 Proposed Disturbance

Based on preliminary planning, the details and sizes of the various solar facility components described in all facilities' plans of development are summarized below in **Table 2-2**. The information and details described in this table may change as plans evolve during the planning process. Estimates for the maximum development scenario were derived using the best available information from the current plans of development and updates for each project. Where estimates were unknown, the averages of other similar project disturbance were extrapolated.

Table 2-2. Foreseeable Development by Component

Solar Field and Battery Storage	Estimates for Maximum Development[1]
PV panel array (MW)	6,200
BESS (MW)	5,200
Infrastructure and Ancillary Systems	—
Site size (acres)	59,650
Disturbed area on the site (acres)	48,351
Access roads and solar field roads (acres)	445
Gen-tie roads (acres)	154
PV modules (acres)	39,039
BESS (acres)	393
On-site substation (acres)	252
O&M facilities (acres)	141
Gen-tie structure areas (acres)	283

Solar Field and Battery Storage	Estimates for Maximum Development[1]
Gen-tie ROW/easement (acres)	803
Fencing (linear feet)	1,471,599
Gen-tie line distance (miles)	35
Construction (Temporary Disturbance)	—
Temporary (laydown) use areas (acres)	292
Temporary roads (acres)	147
Temporary gen-tie disturbance (acres)	409
Water use (acre-feet [AF])	10,607
Construction workforce (number of workers)	4,225
Construction timeline (years)	5
Operation and Maintenance	—
O&M workforce (average number of full-time workers)	75
Long-term water use for O&M (acre-feet per year [AFY])	403

Sources: 335ES 8me LLC 2021; 336SP 8me LLC 2021; Boulevard Associates LLC 2021; CG Western Renewables III LLC 2021; Gold Dust Solar LLC 2021; Nivloc Solar Energy LLC 2021; US Solar Assets 2021
Additional/updated estimates were submitted to the BLM by project applicants in July 2023.
Source for project area/ROW acres: BLM GIS 2023
[1]Total for all Esmeralda 7 projects combined

2.1.3 Construction

Site Preparation and Stabilization

For the proposed projects, a licensed professional surveyor would conduct a land survey of the project sites and stake the construction areas, as needed, before construction begins. Typically, a construction entrance site access road and laydown area for storage and equipment are constructed first. Next, equipment and supplies are brought in, water storage is constructed or installed, and site fencing and security measures are installed.

Site preparation to smooth the surface for the solar array and other equipment would be conducted at this stage. Some projects could use the techniques of mowing or "disk and roll" (using rubber-tired tractors with disking equipment and drum rollers to remove vegetation and smooth the area) to work existing vegetation into the underlying surface soils, where feasible. Conventional grading could be used for other projects or in areas where mowing or disk and roll are not suitable. Drainage controls are typically also installed at this stage. Vegetation in other areas could be mowed to the height required for site maintenance and fire risk management.

To prevent increased dust and erosion around the construction sites and to comply with Esmeralda County dust-control requirements, appropriate erosion- and dust-control measures would be implemented for both the solar facilities and the gen-tie facilities. The project applicants would prepare a site rehabilitation and restoration plan that would document erosion- and dust-control measures to be implemented, including:

- Soil stabilization measures to prevent soil from being eroded by stormwater runoff
- Establishment of temporary laydown areas on level ground
- Avoidance of blading in laydown areas, where feasible
- Minimization and control of dust generated during construction by applying water or BLM-approved palliatives, or both

Soil stabilization measures would include BMPs to protect the soil surface by covering or binding soil particles. Depending on the site preparation technique, organic matter could be worked into the upper soil layers or mulched on-site and redistributed into the fill (except under equipment foundations, trenches, and roadways) to aid in dust control. Construction contractors would also develop and implement an erosion-control plan for each project and incorporate measures required by regulatory agency permits and contract documents, as well as other measures selected by the contractor. The contractor would design project-specific BMPs to protect the soil surface from erosion; the BMPs would be included in the project stormwater pollution prevention plan.

The applicants would prepare a fugitive dust-control plan in compliance with Nevada Department of Environmental Protection air quality regulations. This plan would describe measures to minimize fugitive dust emissions during construction and operations. A stormwater pollution prevention plan would also be prepared that would outline protocols to control stormwater runoff. Appropriate water-erosion and dust-control measures would be implemented to prevent an increased dust and sediment load to ephemeral washes around the construction site and to comply with Esmeralda County dust-control requirements. Dust during construction would be controlled and minimized by applying water or BLM-approved palliatives, or both.

Temporary Use Areas

Temporary use areas, sometimes called laydown or mobilization areas, would be used for storage of construction supplies and parking for workers and construction vehicles. These areas also would be used for temporary equipment needed during construction, such as mobile-trailer construction offices, temporary water service and holding tanks for fire-water supply, temporary construction power, portable toilets, and tool sheds or containers. The areas are typically bladed to remove vegetation and level the contours. Based on the soil conditions, gravel or other materials may be placed if there are concerns about excessive dust or muddy conditions occurring. Topsoils, if present, and removed vegetation can be stockpiled for use in reclamation, or they can be worked into the topsoil layers. Once construction is complete, the areas could be reclaimed and revegetated with native vegetation, or they could be converted to use as part of the operational facility.

Construction Materials and Resources

The quantities of construction materials required for the projects, such as gravel, aggregate (or road base), asphalt, and concrete, depend on the geotechnical analysis and final arrangements and layouts. These layouts would be part of the detailed design, and the material requirements would be estimated at that stage in the projects.

Water requirements would vary by project; estimates vary from 307 to 4,600 AF of water during project construction for construction-related activities, including dust control, soil compaction, worker consumption, and fire safety. Water would be purchased from either a public or private entity. The water would be trucked in on an as-needed basis or trucked in and stored in on-site tanks. It is also possible that water could be sourced from new well locations within the solar facility boundary.

Construction power would likely be provided by a temporary connection to the existing distribution service in the area. Alternatively, generators could be used to provide temporary construction power.

Construction Methods

PV arrays are typically constructed of metal, vertical pylons or support members that are driven into the ground or installed into poured concrete piers. Horizontal racks or table frames connect to the vertical support members, creating a near-horizontal mounting surface. Mounting brackets of other mounting systems attach the solar panels to the racks. The support members, racks, and mounting system are installed first, with solar panels installed either immediately following as assembly progresses or later after the entire rack and mounting system are complete. Projects may use a phased approach where blocks or rows of PV arrays are completed and brought online one at a time, or the entire solar field may be constructed at once before being brought online.

For the Esmeralda 7 projects, electrical construction would consist primarily of the following elements:

- Equipment—All electrical equipment would be installed, including direct current combiner boxes, power conversion station shelters (including inverters), transformers, circuit breakers, disconnect switches, switchgear and distribution panels, lighting, communication equipment, control equipment, and supervisory control and data acquisition equipment.
- Cables—All cables necessary to energize the project equipment would be installed, including instrument control wiring. High-, medium-, and low-voltage cables could be routed via cable trays, above-grade conduits, below-grade conduits in duct banks, or overhead structures.
- Grounding—All equipment and structures would be grounded, as necessary. Within the solar field, an appropriate grounding system would be engineered and constructed to maintain personnel safety and protect equipment.
- Telecommunications—Multiple communication systems would be required for the project to properly operate, including a transmission line, fiber optics, microwave systems, and telephones. All communications would be installed during electrical construction.

The on-site substations would be constructed based on applicable electrical safety codes. On-site substations are typically fenced separately to provide increased security around the medium- and high-voltage electrical equipment. To install a grounding system and the foundations for transformers and metal structures, the substation area could be excavated to a depth of approximately 10 feet. The area would be backfilled, compacted, and leveled followed by application of 6 inches of aggregate rock base. Equipment, including the transformers; breakers; buswork; metal, dead-end structures; and a prefabricated control house or other housing, would be installed to house the electronic components required of the substation equipment.

Construction Time Frames

Construction would generally occur between 5:00 a.m. and 5:00 p.m., Monday through Friday, but could occur 7 days a week. Additional hours could be necessary to make up schedule deficiencies or to complete critical construction activities. For instance, during hot weather, it could be necessary to start work earlier (as early as 3:00 a.m.) to avoid work during high ambient temperatures. Also, construction could require some nighttime activity for installation; refueling equipment; staging material for the following day's construction activities; service or electrical connection; or inspection, quality assurance and quality control, and testing activities. Nighttime activities would be performed with temporary lighting. Some activities could require periods of construction activities 24 hours per day, 7 days per week.

During the construction period, typical construction traffic would consist of trucks transporting construction equipment and materials to and from the site, and management and construction employee vehicles. Most construction workers would commute daily to the jobsite from within a 90-minute commute area that includes the communities of Goldfield, Tonopah, Dyer, and Hawthorne. Prior to the start of construction, the project applicants would prepare a traffic management plan to address project-related traffic.

Construction of each project is expected to take between 18 and 36 months. Daily trips during construction of the project would be generated by delivery of equipment and supplies and the commuting of the construction workforce. The number of workers expected on the site during each project's construction would vary over the construction period and by project. All project-related parking would be on-site during construction.

2.1.4 Operations and Maintenance

Inspections of facility components would occur following a set schedule developed by the operators. Additional inspections could occur, as needed, due to exceptional circumstances.

After construction is complete, the annual water consumption during operations is expected to range from 10 to 120 AF per project, depending on the facility size for each project, for use in panel washing, dust control, and employee consumption. The projects would not require processed water for panel washing and dust control; however, projects with O&M facilities could require potable water for employee consumption. The main consumption of water during operation would be for panel washing and occasional dust control. The applicants would prepare a water quality management plan that would include measures that the applicants would take to minimize the impacts on water quality from operations, including measures for erosion and sediment control, flood control, and stormwater monitoring and response.

Administrative and management personnel, plant operators, maintenance technicians, and site security would be required for the ongoing operation of a solar plant. The number of personnel would vary based on the size of the plant and workforce decisions made by individual solar operators.

The applicants would develop an emergency response plan that presents the results of a comprehensive facility hazard analysis and, for each identified hazard, a response plan. The emergency response plan would assign roles and actions for on-site personnel and responders; it would also designate assembly areas and response actions. Any hazardous materials on the site would be handled, stored, and disposed of in accordance with applicable laws and regulations. Waste from the sites would be recycled or disposed of in an approved facility.

O&M would require the use of vehicles and equipment, including trucks for panel washing and crane trucks for minor equipment maintenance. Additional maintenance equipment used occasionally could include forklifts; manlifts; chemical application equipment for weed abatement; and large, heavy equipment, including cranes. Pickup trucks would be in daily use on the sites. At designated intervals, typically every 10 to 15 years, major equipment maintenance would be performed; this could require heavy equipment to be transported to the site.

2.1.5 Decommissioning and Reclamation

Decommissioning details would be developed and provided to the BLM at the time permanent closure is closer, and more information is available. The BLM would require the applicants to submit a decommissioning, abandonment, and site reclamation plan. At the end of all PV arrays' facility life, structures, equipment, and infrastructure would be removed from the site and disposed of or recycled in the manner specified in the approved decommissioning, abandonment, and site reclamation plan. The plan would include all activities required to dispose of or to store all hazardous and toxic materials and chemicals associated with the project. It also would outline a recycling strategy for applicable components. This plan would discuss all currently applicable laws, ordinances, regulations, and standards associated with the safe storage or disposal of these materials.

Graded areas would be regraded, if necessary, to match the topography of the surrounding area. All disturbed areas would then be revegetated using an approved seed and plant mix.

2.2 ALTERNATIVE B. SOILS AND VEGETATION CONSERVATION ALTERNATIVE

This alternative would be the same as the Proposed Action, but there would be no amendment to the Tonopah RMP to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would be based on the additional slope criteria outlined in the Solar RMPA (BLM 2012; see below). In addition, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Applicants would use mowing in the rest of the development area to leave vegetation intact. In mowed areas, vegetation would be mowed to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters), where justified.

According to the Solar RMPA, applications may include some lands with up to 10 percent slope where higher slope inclusions meet all of the following: (1) they are proximate to variance lands in the application, (2) they are not otherwise excluded from development, (3) they allow for the avoidance or minimization of resource conflicts, and (4) they do not create any significant new or additional conflicts. In such cases, a land use plan amendment would not have to be adopted as part of the project-specific analysis to permit the slope exception.

2.3 ALTERNATIVE C. NO ACTION ALTERNATIVE

Under Alternative C, the No Action Alternative, the BLM would not amend the Tonopah RMP. Future development could be constrained by the existing VRM classifications or slope requirements.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

In accordance with 40 CFR 1502.14(a), agencies are required to describe the alternatives considered but eliminated from detailed study and to provide a brief rationale for eliminating the alternatives. Alternatives should be explored and objectively evaluated in the environmental impacts statement (EIS). For alternatives that are eliminated from detailed study, the EIS should briefly discuss the reasons for eliminating them (40 CFR 1502.14(a)). Per 40 CFR 1508.1, "reasonable alternatives means a reasonable range of alternatives that are technically and economically feasible and meet the purpose and need for the proposed action."

The BLM NEPA handbook (H-1790-1) indicates that the range of alternatives should explore alternative means of meeting the purpose of and need for the action (BLM 2008a). The purpose and need statement helps to define the range of alternatives. Within the range of alternatives evaluated, the EIS must at least consider the proposed action and no-action alternative and provide a description of alternatives eliminated from further analysis (if any exist), with the rationale for elimination. The BLM must analyze those alternatives that are necessary to permit a reasoned choice.

The BLM NEPA handbook also indicates that the CEQ regulations direct that an EIS ". . . include reasonable alternatives not within the jurisdiction of the lead agency" (40 CFR 1502.14). The BLM reviewed potential alternatives to determine whether they were consistent with the following criteria: (1) they were consistent with the purpose and need, (2) they were technically practical and feasible, (3) they were economically practical and feasible, and (4) they were environmentally reasonable. As required by regulation, in addition to the Proposed Action, the No Action Alternative is included in this document (40 CFR 1502.14(c)) as an alternative carried through for full analysis.

The BLM considered seven other alternatives but dismissed them from detailed analysis. **Table 2-3** summarizes these alternatives. Additional details regarding the alternatives considered but dismissed, as well as the rationale for dismissal, are provided in the table.

Table 2-3. Alternatives Considered but Not Analyzed in Detail

Alternative Considered but Not Analyzed in Detailed	Rationale For Elimination of the Alternative
Limited Workforce Alternative: This alternative would have an upper limit on workforce personnel that would be allowed within the planning area at any given time.	The details for each project's design and siting would be finalized during the next phase of project-specific NEPA analysis. During the NEPA analysis for specific projects, the BLM may identify additional design features to lessen social and economic impacts, as warranted. This alternative meets the elimination criteria of being technically infeasible due to unknown site-specific information during this programmatic review.
Conservation-Focused Alternative: This alternative would designate the region as the Esmeralda/Fish Lake ACEC, as proposed in the August 2023 nomination from Friends of Nevada Wilderness.	The BLM has conducted a review of the relevance and importance criteria for the nominated Esmeralda/Fish Lake ACEC (see **Appendix C**). Based on the evaluation of the resources within the nominated ACEC, relevance and importance criteria have been met for some cultural resources and plant resources. These resources are located in various areas throughout the nominated ACEC and, in some cases, are limited in their occurrence. However, existing management and statutory responsibilities would be sufficient to protect these resources and no special management has been identified. Therefore, designating the 850,000-acre nominated Esmeralda/Fish Lake ACEC was not recommended.
Development Siting and Resource Avoidance Alternative: Under this alternative, development would be prioritized in areas with lower resource values to avoid sensitive resources and resource conflicts.	The details for each project's design and siting would be finalized during the next phase of each project and the site-specific NEPA analysis for each project. This PEIS/RMPA incorporates design features that include avoidance and buffer areas for sensitive resources. During the NEPA analysis for specific projects, the BLM may identify specific areas of avoidance, as warranted. This alternative meets the elimination criteria of being technically infeasible due to unknown site-specific information during this programmatic review.

Alternative Considered but Not Analyzed in Detailed	Rationale For Elimination of the Alternative
Evaluate the Esmeralda 7 Projects in the Updated Solar PEIS: This alternative would rely on the Utility-Scale Solar Energy Development Programmatic Environmental Impact Statement (Draft 2023) to address the Esmeralda 7 projects.	The Draft Utility-Scale Solar Energy Development PEIS has already been published. Its intent is to evaluate and identify reasonable areas available to solar development proposals in 11 western states. It is not intended to evaluate specific ROW applications for solar development. The Battle Mountain District Office must review and consider the Esmeralda 7 ROW permit applications. This NEPA analysis includes a review of the proposed projects to ensure they are consistent with the 2012 Solar PEIS and incorporate the relevant design features. An NOI to update the Solar PEIS was published in the *Federal Register* on December 8, 2022. This alternative meets the elimination criteria of being technically infeasible due to the updates to the Solar PEIS not being complete at this time, and no decision has been made.
Relocate the Greenlink West Transmission Line Corridor: This alternative would include moving the Greenlink West transmission line closer to the highway.	Any alternative locations for the Greenlink West transmission line are analyzed in that specific EIS and are outside the scope of this PEIS/RMPA. This alternative meets the elimination criteria of not being effective (it would not respond to the purpose and need).
Substation Capacity: This alternative would limit ROW permits and development based on the anticipated Esmeralda Substation capacity.	The BLM must review and consider all ROW permit applications. The BLM has no discretion over power purchase agreements and cannot assume which projects will be able to tie into the substation for the Greenlink West transmission line. ROW applicants will also be required to comply with the regulations outlined under 43 CFR 2805.12 regarding power purchase agreements. This alternative meets the elimination criteria of not being effective (it would not respond to the purpose and need).
Develop Solar Projects in the Millers SEZ: This alternative would relocate the solar project proposals to be within the Millers SEZ northeast of the planning area.	The BLM must review and consider all ROW permit applications as submitted by the applicants. This alternative meets the elimination criteria of not being effective (it would not respond to the purpose and need).

2.5 COMPARISON OF EFFECTS BY ALTERNATIVE

Table 2-4 compares the anticipated effects from the Proposed Action, Alternative B, and Alternative C on the resources analyzed in this PEIS/RMPA. **Chapters 3** and **4** provide more detail on the affected environment and include analysis methods and rationale for the effects conclusions.

Table 2-4. Comparison of Effects by Alternative

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Air Quality and Climate	Under the Proposed Action, potential impacts on air quality would be of most concern during the construction phase. During construction, fugitive dust from soil disturbances and engine exhaust from heavy equipment and commuter, delivery, and support vehicular traffic within and around the facilities would contribute to air emissions. During the operations phase, emissions would include fugitive dust and engine exhaust emissions from vehicles and heavy equipment associated with regular site inspections, infrequent maintenance activities, and wind erosion from bare grounds and access roads (BLM 2012). Emissions would also depend on the solar technology used; emissions may include criteria pollutants and hazardous air pollutants (HAPs) from small boilers, space heating boilers, emergency power generators (typically only operating a few hours a month), and emergency fire-water pumps. Air quality impacts from decommissioning and reclamation activities would be similar to those from construction activities but on a more limited scale and of shorter duration. Additionally, air quality impacts would be minimized due to less fleet turnover, increases in efficiency, and the use of alternative fuels during decommissioning. Impacts from construction, operation, and decommissioning would be minimized through the implementation of programmatic design features and dust-control measures outlined in **Appendix B**.	Under Alternative B, potential impacts on ambient air quality would be of most concern during the construction phase. Traditional construction grading methods would be limited to 35 percent of the proposed development area. Compared with the Proposed Action, this would reduce the potential for fugitive dust from soil disturbances and engine exhaust from heavy equipment used to perform vegetation removal and grading. In addition, Alternative B would leave vegetation in 65 percent of the development area intact; as such, emissions associated with decommissioning and reclamation activities are expected to be substantially less than those associated with the Proposed Action. Alternative B would not differ materially from Alternative A during the operation phase. As such, Alternative B would incorporate the same programmatic design features and dust-control measures.	Under Alternative C, surface disturbances and combustion emissions would not occur for projects in the planning area and surface disturbance associated with project construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no effects from the solar projects on direct and indirect air quality emissions. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation on existing roads, highway vehicle use, and road maintenance, would continue to result in emissions as well as localized ground disturbance and vegetation removal. These would contribute to ongoing, localized impacts on air quality.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Biological Resources	Under the Proposed Action, disturbance could occur anywhere within each project area during construction. This would cause significant disturbance to the ground surface and vegetation in each project area. Portions of each project area would likely be avoided due to resource or other constraints, such as avoiding sensitive areas, habitats occupied by special status plant or wildlife species, and culturally sensitive areas. To avoid these areas, habitat assessments and surveys would be conducted, and the design features and BMPs identified in **Appendix B** would be implemented. However, residual direct or indirect effects on special status plant and wildlife species could still occur if required preconstruction surveys fail to detect and document all occupied habitat, or environmental conditions reduce or prevent detectability. Soil-disturbing activities can lead to direct and indirect impacts on biological resources, including special status species. Direct impacts on vegetation include direct removal of plants and seed banks and soil biological crusts during soil-disturbing activities, crushing of plants by equipment or personnel, decreased plant productivity from the loss of adjacent pollinator habitat, changes in soil moisture availability due to altered hydrologic conditions, changes in nutrient availability due to soil horizon mixing and reduced mycorrhizal activity, and an increased potential for nonnative, invasive plant establishment and spread within occupied habitat. Direct impacts on wildlife include disturbance, injury, or mortality, while indirect impacts include habitat fragmentation, increased noise, and pollution. Human-caused noise can cause wildlife changes in habitat use, changes in foraging behavior, stress, weakened immune systems, reduced reproductive success, increased predation risk, disrupted communication, and hearing damage. Noise during construction would be primarily associated with equipment and vehicle use but could also be generated from ongoing project maintenance and operation, potentially causing long-term effects on wildlife. Additionally, utility-scale solar projects could attract bird species that mistake solar arrays for waterbodies, causing injuries or mortality. Waterbirds are particularly at risk, as they require water takeoffs and landings. Once they land on the desert floor, they often become stranded and perish, making them particularly vulnerable to these potential hazards. Potential impacts would be reduced by following the design features and BMPs in **Appendix B**.	Under Alternative B, surface disturbance and vegetation removal would be less than under the Proposed Action. This is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent of vegetation would be mowed to 18 to 24 inches tall. Plants that continue to grow within mown areas would be expected to continue to provide habitat function to wildlife, such as forage and shelter, particularly for insects and pollinators, small mammals, birds, and reptiles; however, this habitat would be of lower quality due to the loss of complex vegetation structure, the smaller plant stature, the anticipated loss of some plant species that are less resistant to disturbance, and reduced seed sources available on-site. Alternative B would incorporate the design features and BMPs identified in **Appendix B**.	Under Alternative C, surface disturbance from construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no effects from construction on vegetation, including special status plant species, noxious weeds, and nonnative, invasive plant species. There would also be no changes in existing wildlife habitat conditions from construction. Ongoing human uses of the planning area, including ROW maintenance and off-road recreation on existing roads, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized nonnative, invasive plant establishment and spread, primarily along these routes. These would also result in periodic disturbances to wildlife species.
Forestry	Under the Proposed Action, disturbance could occur anywhere within each project area during construction. Construction would change these areas to developed surfaces, like concrete, compacted gravel, or compacted soil, that do not support vegetation, or that only support limited, typically nonnative annual species adapted to disturbed conditions. As a result, many areas within each project area would cease to be suitable for collecting native seeds and cacti. It is likely that as each project progresses through design phases, the actual location of surface disturbance would avoid certain species or areas due to resource or other constraints. Still, the entirety of each project area would cease to be available for native seed and cactus collection because access to the project area would be restricted. Prior to implementation of each project, cactus species in each project area would be available for collection. Potential impacts would be reduced by implementing the design features and BMPs in **Appendix B**.	Alternative B would have similar effects on the availability of native seeds and cacti for collection as the Proposed Action, due to disturbance during construction and restricted access to developed areas. However, under Alternative B, surface disturbance and vegetation removal would be less than under the Proposed Action. This is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent of vegetation would be mowed to 18 to 24 inches tall. As a result, there would be less removal of native seeds and cacti for collection during construction. However, since access to developed areas would still be restricted, these harvest opportunities would become unavailable. Alternative B would incorporate the design features and BMPs identified in **Appendix B**.	Under Alternative C, surface disturbance, vegetation removal, and access restrictions would not occur as described under the Proposed Action. Until additional analysis is completed, and projects are approved, native seeds and cacti would continue to be available for permitted harvest and collection activities following the procedures outlined in the Tonopah RMP and ROD (BLM 1997) and BLM IM 2013-176, Seed Collection Policy and Pricing.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Cultural Resources	Under the Proposed Action, ground-disturbing construction activities would adversely affect 44 precontact sites in the planning area that are eligible under Criterion D for listing on the National Register of Historic Places (NRHP). Potential adverse effects on known cultural resources could occur from theft or vandalism during construction. Construction would likely deter the normal recreation by the general public that currently occurs in the planning area and reduce vandalism or theft by the general public; however, the number of personnel on-site would vary over the construction period and by project and workers may remove or otherwise disturb cultural resources. Education and other design features (**Appendix B**) would be implemented to reduce potential impacts.	Under Alternative B, impacts would be similar to those described under the Proposed Action. While Alternative B would leave more vegetation on the project site because it would entail implementation of alternative site preparation methods, Alternative B's overall visual effects would be the same as those under the Proposed Action due to the type and scale of the projects.	Under Alternative C, surface disturbance from construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, there would be no effects on historic properties or unevaluated cultural resources that are sensitive to visual changes to the setting. Ongoing human uses of the planning area, including ROW maintenance and off-road recreation, would continue to result in localized impacts on historic properties or unevaluated cultural resources.
Hydrologic Resources	Under the Proposed Action, approximately 10,607 AF of water would be used for dust control, soil compaction, reclamation, preparation of any concrete required for foundations, and other activities. Based on the Supplemental Information Report (BLM 2024b), the total annual water use for O&M is expected to be approximately 403 acre-feet per year (AFY). Some project applicants may transport water to the project area using 3,500-gallon trucks, which could indirectly impact water quality through increased erosion, sedimentation, and altered drainage patterns from increased vehicle traffic and road maintenance. Impacts on surface water resources, wetlands, and riparian areas from construction could include increased sedimentation from road runoff and from road crossings, bridges, and culverts. Increased sedimentation could also occur from increased erosion due to ground-disturbing activities. Accidental spills of harmful substances could also contaminate surface water resources, wetlands, and riparian areas, which would increase water quality degradation. Impacts on groundwater resources from construction could include groundwater drawdown due to withdrawal for dust control, soil compaction, reclamation, preparation of any concrete required for foundations, and other construction activities. However, changes to existing groundwater levels are expected to be within accepted levels. Accidental spills of harmful substances could contaminate shallow groundwater resources, resulting in decreased water quality. Impacts from O&M activities would be similar to those from construction, but they would be less frequent and intense.	Under Alternative B, impacts would be similar to those described under the Proposed Action; this is because the water requirements would remain the same, and the same amount of each project area would be disturbed during construction. However, under Alternative B, a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent would be mowed down to 18 to 24 inches tall. This construction method would result in similar soil disturbance and compaction, but it would reduce vegetation removal compared with the Proposed Action. The impacts on surface water resources, wetlands, and riparian areas from construction would be less than those under the Proposed Action; this is because of the decreased erosion and sedimentation due to less vegetation removal.	Under Alternative C, the existing water resource uses and trends would continue. Water would not be used for projects in the planning area, and surface disturbance associated with project construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, there would be no impacts on surface water, groundwater, wetlands, and riparian areas from the construction and operations of the Esmeralda 7 projects.
Geology and Minerals	Under the Proposed Action, utility-scale solar energy development would be incompatible with most mineral development activities and would preclude these activities within developed areas once the solar energy facilities are constructed. There are claims adjacent to the planning area that could potentially access similar minerals to those within the planning area. It could be more difficult to economically develop these claims if contiguous mineral claims are not able to be developed.	Under Alternative B, there would be no RMP amendment to change the slope requirement for the planning area to a maximum of 10 percent. This management would not result in different impacts on geology and minerals from the Proposed Action. Impacts on geology and minerals would be the same as described under the Proposed Action.	Impacts on mineral resources would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, no potential impacts on geological features from surface-disturbing activities would occur.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Lands, Realty, and Cadastral Survey	There would be no changes to existing ROW areas. If approved and all solar sites are developed, the Proposed Action would bring an additional 5.6 GW of power to Nevada's electric grid. This large influx of power may necessitate the additional approval or development of additional utility and energy-related infrastructure. The Proposed Action would not conflict with existing commercial, residential, agricultural, utility, transportation, or communication facilities in the planning area. The potential impacts on industrial uses (such as minerals and gravel, or mineral claims) are discussed further under **Section 4.6**, Geology and Minerals. The Proposed Action would not be consistent with the Tonopah RMP for VRM classifications and would necessitate an RMPA.	Under Alternative B, impacts on ROWs, land use authorizations, and land use patterns would be the same as described under the Proposed Action. However, under Alternative B, there would be no amendment to the Tonopah RMP to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would only be allowed based on the additional slope criteria outlined in the Solar RMPA (BLM 2012).	Under the No Action Alternative, there would be no impacts on ROWs, land use authorizations, and land use patterns at this time. Each solar project would be subject to separate analysis and approval for future development. Demand for utility and energy-related ROW applications and approvals would remain at current levels until future development occurs.
Lands with Wilderness Characteristics	Under the Proposed Action, construction ground disturbance would occur across all the temporary or permanent ROW areas; this disturbance would temporarily impact opportunities for solitude and primitive and unconfined recreation. This disturbance also would have long-term effects on the apparent naturalness within the planning area. Motorized travel along ROWs (for inspection, maintenance, and brush clearing) that would occur adjacent to a given existing inventoried lands with wilderness characteristics unit would result in sounds that would degrade the natural setting and affect people's opportunities for solitude and primitive recreation.	Under Alternative B, the effects on inventoried lands with wilderness characteristics would be similar to the effects described under the Proposed Action. During decommissioning, effects on the apparent naturalness of inventoried lands with wilderness characteristics would be lessened under this alternative due to the reduced time for regrowth of vegetation in areas that were mowed instead of graded.	Under Alternative C, surface disturbance from construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no effects on inventoried lands with wilderness characteristics.
Native American Concerns	Under the Proposed Action, construction would result in the loss of vegetation and have effects on wildlife species important to Native Americans. Further, the Proposed Action could have adverse effects on traditional cultural properties and precontact archaeological resources important to Native Americans. The effects of O&M would be similar to those from construction. Any new significant precontact resources found on the project sites during construction would be treated in accordance with Tonopah RMP and design features outlined in **Appendix B**, which would be outlined in the required cultural resources management and mitigation plan (CRMMP).	Under Alternative B, the impacts from construction, operation, and decommissioning activities would be the same as those described under the Proposed Action.	Under Alternative C, there would be no impacts at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, existing conditions in the planning area would continue.
Noise	The Proposed Action, would increase the level of noise generated in the planning area, altering the acoustic environment. The greatest impacts on the acoustic environment would be associated with equipment and vehicle use during the construction phase. During construction, many pieces of heavy machinery and vehicles are used that generate noise, which is experienced by residents, recreationists and travelers, and wildlife in the planning area. In general, construction-related noise causes potential hazards to the workers and the ecosystem. Noise can also be generated from ongoing project maintenance, which would have long-term effects on wildlife and humans. Impacts would be minimized through implementation of the design features outlined in **Appendix B**. In addition, travel to and from the project area for solar energy development and maintenance would contribute to the region's acoustic environment. Using existing travel routes for construction purposes would contribute to short-term noise impacts, depending on the time of day and the scale of operations.	Under Alternative B, the impacts on the acoustic environment during construction and maintenance would be similar to those under the Proposed Action. Alternative B would introduce the utilization of mowing in 65 percent of the development area. This would contribute to additional noise and, specifically, increased dB levels compared to the construction equipment that would be used.	There would be no impacts on the acoustic environment at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, the acoustic environment would remain unchanged.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Paleontological Resources	Direct impacts would include the damage or loss of paleontological resources from ground-disturbing activities. Impacts would be minimized through implementation of design features (**Appendix B**). Indirect impacts would also result from project activities, including the potential for increased erosion that would expose and affect the condition of paleontological resources. Increased access by workers in the planning area could increase the likelihood of impacts on paleontological resources from vandalism or unauthorized collection.	Under Alternative B, the effects on paleontological resources would be very similar to the effects described under the Proposed Action. However, measures intended to conserve intact soils and vegetation, specifically limiting the amount of construction grading to 35 percent of the proposed development area, would limit surface disturbance and the related impacts to a greater degree than Alternatives A and B.	Under Alternative C, there would be no impacts at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, existing conditions in the planning area would continue.
Rangeland – Grazing Management	Under the Proposed Action, there would be the potential for ground disturbance, lowered forage quality from the spread of noxious weeds, and the potential for livestock death from vehicle collisions. However, most development would be outside grazing lands; therefore, the impacts on the management of the allotments themselves would be minimal. Access to wells and existing range improvements would not be cut off because of development of these solar projects.	Under Alternative B, impacts would be similar to those described under the Proposed Action with the potential for less impact on forage availability.	Under Alternative C, there would be no impacts on livestock grazing at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, grazing would continue as it currently occurs in the planning area.
Recreation	During construction, traffic could temporarily increase on US Route 95 and Nevada State Route (SR) 265, though neither roadway would be closed. Traffic delays could impact the recreational experience by causing delays in access to recreational areas for those traveling through the planning area. During construction, increases in human activity and related noise and traffic would change the recreational setting of the planning area and surrounding lands with recreational values by decreasing the sense of solitude. Additionally, construction activity and noise could displace big game species that travel through the area, which could decrease populations available for hunting in adjacent mountain ranges. These impacts are expected to be short term, assuming big game species return after construction. The result of these changes could make recreation in the locations within and surrounding the planning area less appealing. The development of the seven solar projects would displace opportunities for recreation. The Proposed Action would displace recreation in the planning area where currently undeveloped lands would be developed. Recreation in the surrounding mountain ranges would still be available. Nevertheless, views of the valley from the surrounding mountain ranges would be degraded because of surface disturbances, new infrastructure, and the loss of vegetation associated with the Proposed Action, thereby diminishing the recreational setting in the long term. All existing routes that overlap the planning area would be maintained. As a result, there would be no change in public access to any recreational opportunities, such as the surrounding mountain ranges and the Casey Folks Vegas to Reno Race. Nevertheless, the recreational experience of participating in or spectating the race would change due to new infrastructure impacting the visual setting of this section of the race.	Under Alternative B, the impacts on recreation would be similar to those described for the Proposed Action. However, the applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. The applicants would use mowing in the rest of the development area to leave vegetation intact. This would minimize surface disturbances and maintain vegetation; both would maintain the natural landscape viewed and experienced during recreation, resulting in somewhat fewer impacts on the recreational setting.	Under Alternative C, there would be no impacts on recreation at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved recreational use would remain unchanged.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Social Values, Economic Conditions, and Environmental Justice (EJ)	Under the Proposed Action, direct labor income contributions would be approximately $108.9 million annually over the 5-year time frame, while total labor income (including direct, indirect, and induced income) would be approximately $130 million. Total employment would be an estimated 1,849 jobs, and the total value added would be approximately $270 million. Large-scale solar development under the Proposed Action could impact adjacent land uses and induce population changes. These could contribute to effects on quality of life, such as local traffic conditions, noise, the visual setting, and air quality. All these factors could impact local communities, although effects would be more notable during the construction phase of solar development. Impacts on EJ populations could include long-term impacts on the natural and social setting from solar development. EJ populations in the smaller, rural communities in the planning area could be impacted by an influx of transient workers, which could make housing less available or less affordable in these areas. In addition, the travel time to work and associated travel costs for low-income families could increase if the families are displaced by the need for a large supply of short-term labor.	Under Alternative B, effects on economic conditions would be substantially similar to the effects described under the Proposed Action. Disproportionate effects on EJ communities would be possible, as described under the Proposed Action.	Under Alternative C, effects on social values, economic conditions, or EJ communities would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, all the current social characteristics would continue in the planning area.
Soils	Under the Proposed Action, an RMP amendment would be required to allow for construction of solar facilities on lands with slopes greater than 5 percent. This area represents approximately 320 acres (0.5 percent) of the planning area. Soils on slopes greater than 5 percent would be more susceptible to erosion from surface disturbance than soils on slopes less than 5 percent. Where soils are graded and leveled for the placement of infrastructure and ancillary systems, the topsoil would be removed so that only the bare mineral soil remains, and the mineral soil would be compacted. Operation of vehicles within the planning area during construction, operation, and decommissioning would decrease soil porosity, reduce water infiltration, and displace surface soil particles. In turn, the potential for erosion would increase. Impervious surfaces and unpaved, unvegetated areas would increase once the projects are fully built out. This would result in increased stormwater runoff via overland flow, which could redirect surface flows, resulting in increased erosion in both on-site and off-site areas. The most severe impacts on soils would occur during the construction period, during which the most vehicle use would occur. Once the facilities are constructed, including access roads, surface disturbance from the workforce vehicles during O&M activities would be less severe. Heavy equipment and repeated vehicle use over the same areas would increase the potential for compaction, and wet soils would be the most vulnerable. Surface disturbance from vehicle use on biological soil crusts would decrease the abundance of biological communities and reduce the crusts' function to provide soil stability. These would indirectly increase the potential for soil erosion. In contrast, surface disturbance on physical soil crusts would increase their porosity and water infiltration. All soils in the planning area are rated as "poor" for reclamation potential and for topsoil quality. Organic matter amendments to increase water-holding capacity, tilling to increase soil porosity and water infiltration, and artificial drainage and irrigation to promote leaching of undesirable salts could be required. Reseeding would reestablish vegetation cover within a few years. This would promote soil aggregate stability and minimize the erosion potential in the long term.	Under Alternative B, development on slopes greater than 5 percent would be based on the 2012 Solar RMPA slope criteria. No RMP amendment would be required to change the slope requirements in the planning area, and development would not be allowed on areas with slopes greater than 10 percent (50 acres; less than 0.1 percent of the planning area). Most development under Alternative B would occur on slopes less than 5 percent. Compared with the other action alternative, this would decrease the potential for soil erosion. If the areas with slopes between 6 and 10 percent meet the 2012 Solar RMPA slope criteria, development on these areas would increase the potential for soil erosion. However, these effects would be minimal because they would only include up to 270 acres (0.4 percent) of the planning area. Compared with the other action alternative, utilization of mowing methods for 65 percent of the proposed development area would decrease vegetation and topsoil removal and soil compaction. Overall, this would decrease the soil erosion potential in these areas. Where traditional construction grading methods are used (at a maximum of 35 percent of the proposed development area), direct and indirect impacts on soils would be the same as those described under the Proposed Action.	Under Alternative C, there would be no impacts to soils at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, soils conditions would only be impacted by current uses such as grazing and off-road recreation.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Transportation, Access, and Public Safety	Under the Proposed Action, traffic would temporarily increase on US Highways 6 and 95 and on SR 265. The greatest impact would be at the intersection of SR 265 and US Highways 6 and 95, where most of the construction trucks and vehicles would ingress and egress. Access along SR 265 would be delayed, but not restricted, if flaggers stop vehicles to allow construction trucks to ingress or egress. Vehicle trips associated with delivering water needed for O&M activities would approximately double the average daily trips on SR 265. Resulting delays from the increased traffic on SR 265 would not significantly affect free-flowing conditions, but they could increase vehicle encounters and the potential for vehicle collisions. Fencing used to mark the perimeters of the projects would include gaps for access roads. Therefore, public access to designated access roads would not be restricted. Development activities associated with site characterization, construction, operation, and decommissioning of the projects would potentially raise health and safety concerns for construction workers. These would include electromagnetic field exposures and fires. The proposed solar projects would have the potential to cause adverse impacts on nearby residences from noise, sun reflection, flicker, or electromagnetic fields. In addition, dielectric fluids could include sulfur hexafluoride (SF_6), which has a high global warming potential, if emitted. Potential impacts would be reduced by implementing the design features and BMPs in **Appendix B**.	Under Alternative B, the slope and vegetation conservation requirements would not affect the number of vehicles on the road or other factors that impact transportation, access, or public safety. Impacts would be the same as those described under the Proposed Action.	Under Alternative C, impacts on transportation, access, and public safety from the proposed projects would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, current traffic trends would continue.
Visual Resources, including Night Skies	Under the Proposed Action, the full buildout of the projects would remove vegetation. It would add artificial elements to a natural landscape across the footprint. The artificial elements would not resemble elements in the natural landscape. Replacement of vegetation with artificial elements would change the form, color, line, and texture of the landscape across thousands of VRM Class III acres. Also, fencing would be installed around all project components and facilities; however, existing access throughout the planning area would be maintained. This type of moderate to strong change would not be consistent with the Tonopah RMP's VRM Class III objective to partially retain the landscape's existing character. The change would attract attention and would dominate the view of the casual observer from the key observation points (KOPs) closest to the Proposed Action (KOPs 4N, 4S, and 8). For more distant KOPs, it is more difficult for activities to attract the attention and dominate the view of the casual observer across broad views of the valley. Because the Proposed Action would not meet the VRM Class III objective, an RMPA would change VRM Class III lands to VRM Class IV lands. The RMPA would be for 8,110 acres of VRM Class III lands that are not associated with the Greenlink West transmission line ROW. The strong contrast created by the Proposed Action would conform with the newly designated VRM Class IV lands.	Under Alternative B, the effects on visual resources would be similar to those described under the Proposed Action. However, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Mowing would be utilized in the rest of the development area to leave vegetation intact. Compared with under the Proposed Action, this would reduce the contrasts in form, color, and texture created by vegetation changes. Although this would reduce contrasts, it would not change the conformance determinations described under the Proposed Action and the RMPA would still be needed.	Under Alternative C, surface disturbance associated with project construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved,, there would be no effects from construction on visual resources. Ongoing human uses of the planning area, including ROW maintenance and off-road recreation on existing roads would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized changes in vegetation conditions, primarily along these routes. There would be no need for an RMPA because there would be no activities that do not conform with the VRM class objectives.

Resource/Resource Use	Alternative A. Proposed Action	Alternative B. Soils and Vegetation Conservation Alternative	Alternative C. No Action Alternative
Wastes and Materials (Hazardous and Solid)	The Proposed Action would have the potential to result in the use of hazardous materials and waste management practices during the life of solar development projects. These materials and practices would have the potential to affect air, water, soil, and biological resources from an accidental release of hazardous materials and/or solid and hazardous waste during transportation to and from the project development sites, or during store and use at the project development sites. The safety and containment measures that would be implemented during the handling and transport of hazardous materials would minimize the potential for transport-related spills and any spill-related effects, which would likely be minor, short term, and localized. Applicants would also be required to identify waste streams, inspect facility components, develop an emergency response plan, and comply with the programmatic design features for hazardous materials. The programmatic design features for hazardous materials would identify existing hazards, contain construction waste, contain hazardous waste, ensure compliance, ensure secondary containment, minimize the risks for herbicides, minimize the potential for fire, ensure compliance with the spill prevention and emergency plan, and ensure contaminated soils are contained and removed.	Under Alternative B, impacts from wastes and materials (hazardous and solid) from construction, operation, and decommissioning activities would be consistent with those described under the Proposed Action.	Under Alternative C, operations in the planning area would continue, based on current authorizations. Impacts to wastes and materials would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no potential for chemical spills or solid and hazardous material generation from the proposed solar facilities and no implementation of related BMPs, standard operating procedures, or other actions to fall within compliance of the regulations and requirements.
Wild Horses and Burros	Under the Proposed Action, there could be minimal impacts on wild horses and burros. However, because all but 510 acres of the development would occur outside the herd management area (HMA), the impacts would be negligible. There could be isolated forage loss from access roads and disturbance from increased human activity near the HMA. Impacts would still occur outside the HMA, but the BLM only manages for wild horses and burros within HMAs.	Under Alternative B, impacts would be similar to those described under the Proposed Action with the potential for less impact on forage availability from the use of mowing areas rather than completely removing the vegetation.	Under Alternative C, impacts on wild horses and burros from the proposed projects would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, current wild horses and burros trends would continue.

2.6 BLM 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 ROD. 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 determined the Soils and Vegetation Conservation Alternative (Alternative B) is the BLM's preferred alternative.

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Chapter 3. Affected Environment

This chapter describes the existing conditions of the physical, biological, cultural, and socioeconomic resources that have the potential to be affected by activities related to the Proposed Action, Alternative B, and the No Action Alternative described in **Chapter 2**. To comply with NEPA, the BLM is required to address specific elements of the environment that are subject to requirements specified in statutes and regulations, or by executive order. **Table 3-1** lists the supplemental authorities, and **Table 3-2** lists additional affected resources addressed in the PEIS/RMPA. Supplemental authorities (BLM Handbook H-1790-1) that may be affected by the Proposed Action and the alternatives are discussed further in **Chapters 3** and **4** and in the supplemental environmental reports for specific resources, as noted (BLM 2024c, d, e, f, g, and h). Those elements listed under the supplemental authorities that are not present in the proposed planning area boundary or resource-specific study area or are present but would not be affected are not carried through in this PEIS/RMPA.

Table 3-1. Supplemental Authorities

Supplemental Authority	Not Present	Present/Not Affected	Present/ May be Affected	Rationale/Reference Section
Air quality and climate	—	—	Yes	Sections 3.1 and 4.1
Areas of critical environmental concern	X	—	—	Geographic information system (GIS) data were reviewed. There are no designated ACECs in the planning area.
Cultural resources	—	—	Yes	Sections 3.4 and 4.4
Environmental justice	—	—	Yes	Sections 3.14 and 4.14
Floodplains	—	—	Yes	Sections 3.5 and 4.5
Invasive, nonnative species	—	—	Yes	Sections 3.2.1 and 4.2.1
Migratory birds	—	—	Yes	Sections 3.2.2 and 4.2.2
Native American concerns	—	—	Yes	Sections 3.9 and 4.9
Prime or unique farmlands	X	—	—	GIS data were reviewed. There are no designated prime or unique farmlands in the planning area.
Threatened and endangered species	—	—	Yes	Sections 3.2.3 and 4.2.2
Wastes and materials (hazardous and solid)	—	—	Yes	Sections 3.18 and 4.18
Water quality (surface water and groundwater)	—	—	Yes	Sections 3.5 and 4.5
Wetlands and riparian zones	—	—	Yes	Sections 3.5.5 and 4.5
Wild and scenic rivers	X	—	—	GIS data were reviewed. A 2022 inventory was completed for the Battle Mountain District Office, and no river segments were found to be eligible (and thus none are suitable).
Designated wilderness and wilderness study areas	X	—	—	GIS data were reviewed. There are no designated wilderness or wilderness study areas in the planning area.

Table 3-2. Additional Affected Resources

Resource	Not Present	Present/Not Affect	Present/ May be Affected	Rationale/Reference Section
Geology and minerals	—	—	Yes	Sections 3.6 and 4.6
Forestry	—	—	Yes	Sections 3.3 and 4.3
Lands, Realty, and Cadastral Survey	—	—	Yes	Sections 3.7 and 4.7
Lands with wilderness characteristics	—	—	Yes	Sections 3.8 and 4.8
Noise	—	—	Yes	Sections 3.10 and 4.10
Paleontological resources	—	—	Yes	Sections 3.11 and 4.11
Rangeland – grazing management	—	—	Yes	Sections 3.12 and 4.12
Recreation	—	—	Yes	Sections 3.13 and 4.13
Social values and economics conditions	—	—	Yes	Sections 3.14 and 4.14
Soils	—	—	Yes	Sections 3.15 and 4.15
Special status species	—	—	Yes	Sections 3.2.3, 4.2.1, and 4.2.2
Transportation, access, and public safety	—	—	Yes	Sections 3.16 and 4.16
Vegetation	—	—	Yes	Sections 3.2.4 and 4.2.1
Visual resources, including night skies	—	—	Yes	Sections 3.17 and 4.17
Water quantity (surface water and groundwater)	—	—	Yes	Sections 3.5 and 4.5
Wildlife	—	—	Yes	Sections 3.2.5 and 4.2.2
Wild horses and burros	—	—	Yes	Sections 3.19 and 4.19

3.1 Air Quality and Climate

This section addresses the baseline meteorological and air quality conditions in the planning area. The seven proposed facilities would be geographically contiguous and encompass approximately 62,300 acres of BLM-administered lands, approximately 30 miles west of Tonopah, Nevada. Supplemental information is provided in the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

3.1.1 Regulatory Framework

The US Environmental Protection Agency (EPA) is responsible for enforcing the federal Clean Air Act of 1970 (CAA). The national ambient air quality standards (NAAQS) were established by the federal CAA and amended in 1977 and 1990.

As directed by the CAA, the EPA has established NAAQS for six "criteria[1]" pollutants. The EPA adopted these standards to protect public health (through the primary NAAQS) and public welfare against decreased visibility as well as damage to animals, crops, vegetation, and buildings (through the secondary NAAQS). The six criteria pollutants are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), particulate matter less

[1]The EPA call these pollutants "criteria" air pollutants because they are the most common air pollutants and are regulated based on specific criteria related to human health and the environment. These criteria serve as science-based guidelines for setting permissible levels of these pollutants.

than 10 microns in diameter (PM_{10}), and lead (Pb). The seven proposed facilities would be located in Esmeralda County, Nevada, which is currently classified as in attainment or unclassifiable for the NAAQS for all criteria pollutants.

The State of Nevada has developed state standards of quality for ambient air codified in Nevada Administrative Code (NAC) 445.22097.[2] The Nevada ambient air quality standards (NVAAQS) are used in evaluating permit applications for stationary sources by ensuring the stationary source will not cause the state standards to be exceeded in areas where the general public has access. The pollutants are CO, NO_2, O_3, SO_2, particulate matter (PM_{10} and $PM_{2.5}$), hydrogen sulfide (H_2S), and Pb. Esmeralda County, Nevada, is currently classified as in attainment or unclassifiable for the NVAAQS for all criteria pollutants.

Additional details regarding the regulatory setting for the planning area are discussed in further detail in Chapter 2 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

3.1.2 Climate and Meteorology

The planning area is in Esmeralda County, Nevada, between two prominent geomorphological features: the northwest-trending Sierra Nevada to the west and the north-to-south-trending Basin and Range Province to the east. Total relief, the elevation difference between the highest and lowest points on a topographic map, in the basin is more than 9,000 feet, ranging from 13,145 feet above mean sea level at Boundary Peak in the White Mountains to approximately 3,700 feet, where Oriental Wash enters Death Valley at the California border (Farr West Engineering 2022).

Esmeralda County has an arid to semiarid climate. The upper mountain ranges have subhumid continental conditions with cold winters and moderate precipitation. The valleys and the rest of the region experience mid-latitude steppe and desert conditions with cold winters, hot summers, and semiarid to arid conditions. The lowest valley floors have a low-latitude desert climate with hot summers and arid conditions. Precipitation follows a bimodal distribution, with most rainfall occurring during winter or late summer. Winter storms last longer and produce more precipitation compared with short, scattered summer showers. Drought is common, with ongoing and varying drought conditions in most of the county. Average annual evaporation exceeds the average annual precipitation, with average evaporation ranging from 51 to 72 inches (Farr West Engineering 2022). Additional details regarding the regional climatology, including historical climate data and wind rose data collected from the Tonopah airport, can be found in Section 3.1 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

3.1.3 Existing Ambient Air Quality

Regional air quality is affected by the combination of all atmospheric emission sources and can vary dramatically over geography and time. The primary human-caused emission sources in the study area include on-road and off-road mobile sources, fugitive road dust, agriculture, and residential wood heating. The primary drivers of these emissions are fossil fuel combustion and particulate generation from both combustion and material disturbance. Appendix W of 40 CFR 50 contains requirements for obtaining representative background concentrations. Specifically, "air quality data should be used to establish background concentrations in the vicinity of the source(s) under consideration." Regional-scale modeling

[2] https://www.leg.state.nv.us/nac/NAC-445B.html#NAC445BSec22097

and monitoring data can be used to estimate background concentrations of criteria air pollutant design values for use in air permit engineering and decision-making.

Background concentrations for the six criteria pollutants described above were obtained from the Nevada Division of Environmental Protection (NDEP) based on the Proposed Action location. Additional details on the background concentrations can be found in Section 3.2 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

3.1.4 Greenhouse Gases (GHGs)

GHGs are gases in the earth's atmosphere that retain heat, contributing to the greenhouse effect and thus global warming. The major specific GHGs are CO_2, CH_4, N_2O, and fluorocarbons, but they also include water vapor and O_3. Human activity does not directly affect water vapor concentrations and is typically not included in climate change analyses. O_3 is a short-lived species due to instability; therefore, it has a low global warming potential. In general, GHG emissions are inventoried for CO_2, CH_4, N_2O, and high global-warming-potential gases. Climate scientists agree that the earth is undergoing a warming trend and anthropogenic emissions of atmospheric concentrations of CO_2 and other GHGs are one of the primary drivers of global temperature increases. The observed concentrations of these GHGs are projected to continue to increase. Climate change may intensify the risk of ecosystem change for terrestrial and aquatic systems, affecting ecosystem structure, function, and productivity (USDA Forest Service 2010).

The planning area is in the Intermountain Region of the United States. The climate of the Intermountain Region varies significantly throughout the region. Nevada is largely a dry state, with a statewide average precipitation of only 10 inches annually; however, the large elevation range leads to a highly diverse climate. While low deserts of the southern regions experience heat and drying winds, forested mountain areas in the north may experience cold and drifting snow during winter. Climate variability is common within this region, as temperature and precipitation fluctuate on time scales ranging from seasons to centuries. Currently, climate modelers agree that the Intermountain Region is experiencing an average temperature increase trend that will continue well into the latter part of the twenty-first century.

Electricity generation and transportation are Nevada's principal GHG emissions sources. Together, the combustion of fossil fuels in these two sectors accounts for 63 percent of Nevada's gross GHG emissions. The remaining use of fossil fuels (including natural gas, oil products, and coal) in the residential and commercial sectors constitutes another 12 percent of the state's emissions. Industrial process emissions comprise about 17 percent of the state's GHG emissions. Landfills and wastewater management facilities produce CH_4 and N_2O emissions, accounting for 4 percent of the state's GHG emissions. Agricultural activities, such as manure management, fertilizer use, and livestock (enteric fermentation), result in CH_4 and N_2O emissions that account for another 4 percent of the state's GHG emissions. In 2019, Nevada produced approximately 40 million metric tons of net CO_{2e} emissions, an amount equal to 0.63 percent of gross US GHG emissions and 0.71 percent of net emissions.

3.2 Biological Resources

The study area for biological resources is the planning area. The planning area is in the transition between the Central and Southern Nevada Basin and Range, which is an area of broad desert basins and valleys and surrounding north–south-trending mountain ranges (NRCS 2006). The planning area encompasses the southern end of the Big Smoky Valley (including its terminal dry playa lake). This valley is surrounded by alluvial fans and terraces sloping toward the adjacent mountain ranges—the Monte Cristo Range to the north, the Silver Peak Range to the west, and the Weepah Hills and Lone Mountain to the east. Elevations in the planning area range from about 4,700 to 5,500 feet. The average annual maximum temperature is 71.6 degrees Fahrenheit. The average annual minimum temperature is 39.4 degrees Fahrenheit.

Vegetation in the planning area is typical of the lower elevations of the area; it lacks extensive sagebrush shrubland and pinyon-juniper woodland communities associated with higher-elevation areas. Instead, desert shrub and greasewood communities dominate the planning area. These habitat types provide a source of palatable, nutritious forage and cover for a wide variety of wildlife, including migratory birds and raptors, big game species, small mammals, reptiles, and invertebrates.

This section describes the environmental setting of vegetation and wildlife, including special status plant and wildlife species. Additional details are provided in the Biological Resources Supplemental Environmental Report (BLM 2024d).

3.2.1 Invasive, Nonnative Species

Invasive plants are those that are not native and that cause or are likely to cause harm to the ecology, the economy, or human health (Executive Orders 13112 and 13751). Native plants that can become excessively abundant due to disturbance or other modification of an ecosystem are sometimes also called "invasive" (BLM Handbook H-1740-2 [BLM 2008a]); however, these are excluded here.

Noxious weeds and nonnative plant species, including saltover and Russian thistle (*Salsola tragus)*, are designated under federal and state noxious weed acts. Noxious weeds in Nevada are designated in the Nevada Revised Statutes Section 555.010 and are categorized by their distribution and exclusion and/or eradication objectives. The Nevada noxious weed categories include the following:

- **Category A**: Weeds that are generally not found or that are limited in distribution throughout the state. Such weeds are subject to:
  - Active exclusion from the state and active eradication wherever found
  - Active eradication from the premises of a dealer of nursery stock
- **Category B**: Weeds that are generally established in scattered populations in some counties of the state. Such weeds are subject to:
  - Active exclusion where possible
  - Active eradication from the premises of a dealer of nursery stock
- **Category C**: Weeds that are generally established and generally widespread in many counties of the state. Such weeds are subject to:
  - Active eradication from the premises of a dealer of nursery stock

BLM Handbook H-1740-2, Integrated Vegetation Management (BLM 2008b), and the BLM Battle Mountain District Integrated Weed Management Plan for the Mt. Lewis Field Office and Tonopah Field Office (BLM 2009a) direct management of noxious weeds and other nonnative, invasive plant species in the planning area. The integrated weed management plan gives an indication of the type of noxious weeds and nonnative, invasive plants that are likely to be found in the planning area. For example, the plan indicates that ROWs and improved dirt roads in the district are often infested by hoary cress (*Cardaria draba*) and Russian knapweed (*Acroptilon repens*), which are both Category C species; Mediterranean sage (*Salvia aethiopis*), which is a Category A species; and saltlover (*Halogeton glomeratus*), a nonnative, invasive plant.

The plan indicates that disturbed rangelands are often infested by similar species, as well as saltcedar (*Tamarix* spp., Category C), various thistles, and cheatgrass (*Bromus tectorum*), a nonnative, invasive plant. Along waterways and flood zones, there are often infestations of tall white top (*Lepidium latifolium*, Category C), salt cedar, hoary cress, and thistles.

To date, one noxious weed, salt cedar, is known to occur within the planning area. This species has been documented in the Nivloc Solar project area. In this project area, the species grows in a low-lying area along an old railroad grade in the Big Smoky Valley (EDDMapS 2023; BLM GIS 2023). Habitat assessments and rare plant surveys completed in the individual project areas to date have not documented additional noxious weeds (Bio-logical 2022; NewFields 2022a; Stantec 2022a; BEC 2023; SWCA 2023).

Additional noxious weeds that have been documented in the planning area vicinity, but that have not been documented in the planning area, include puncturevine (*Tribulus terrestris*, Category C), hoary cress, and numerous other salt cedar documentations (EDDMapS 2023).

Several nonnative, invasive plants have also been documented in the planning area. These have generally been observed during vegetation and habitat assessments that have been carried out in some of the individual project areas to date (Bio-logical 2022; NewFields 2022a; Stantec 2022a; BEC 2023; SWCA 2023). Nonnative, invasive plants known from the planning area are cheatgrass, kochia (*Kochia scoparia*), tall tumblemustard (*Sisymbrium altissimum*), saltlover, and Russian thistle. These plants are mostly confined to disturbed areas along existing roads and in drainageways. **Table 3-3**, below, summarizes the species that have been documented in each project area.

Field-based assessments and surveys have not been conducted in the Gold Dust Solar or Nivloc Solar project areas to date. Additional noxious weeds and nonnative, invasive plant species may occur in these project areas.

Table 3-3. Nonnative, Invasive Plants

Common Name	Scientific Name	Present in the Project Areas?[1]							Present in the Planning Area?
		EEC	GDS	LMS	NS	RR1	RR2	SVS	
Cheatgrass	*Bromus tectorum*	No	N/A	Yes	N/A	No	No	No	Yes
Kochia	*Bassia scoparia*	No	N/A	Yes	N/A	No	No	No	Yes
Russian thistle	*Salsola tragus*	Yes	N/A	Yes	N/A	Yes	Yes	Yes	Yes
Saltlover	*Halogeton glomeratus*	Yes	N/A	Yes	N/A	Yes	Yes	Yes	Yes
Tall tumblemustard	*Sisymbrium altissimum*	No	N/A	Yes	N/A	No	No	No	Yes

Sources: Bio-logical 2022; NewFields 2022a; Stantec 2022a; BEC 2023; SWCA 2023
Notes:
[1] Field-based surveys have not been conducted to date in the Gold Dust Solar (GDS) or Nivloc Solar (NS) project areas. "N/A" is used for these project areas due to the lack of information.
Solar project name codes are as follows:
EEC = Esmeralda Energy Center
GDS = Gold Dust Solar
LMS = Lone Mountain Solar
NS = Nivloc Solar
RR1 = Red Ridge 1 Solar
RR2 = Red Ridge 2 Solar
SVS = Smoky Valley Solar

Nonnative, invasive plants have also been documented at several existing terrestrial Assessment, Inventory and Monitoring (AIM) monitoring points in the planning area and the immediate vicinity; most of these points were last monitored between 2016 and 2022. Nonnative, invasive plants documented at terrestrial AIM monitoring locations include saltlover, tall tumblemustard, Russian thistle, common Mediterranean grass (*Schismus barbatus*), herb sophia (*Descurainia sophia*), desert madwort (*Alyssum desertorum*), and cheatgrass.

3.2.2 Migratory Birds

Migratory birds are bird species that migrate from breeding grounds in the temperate portions of the continent to winter in the tropics of North, Central, and South America. These also include species such as the rough-legged hawk (*Buteo lagopus*), which breeds in the arctic or boreal regions of North America and winters in temperate portions of the continental US. A number of migratory birds breed in North America and winter in neotropical regions. Some examples of migratory birds that breed in southeastern Nevada, and potentially occur in the planning area, are burrowing owl (*Athene cunicularia hypugaea*), LeConte's thrasher (*Toxostoma lecontei*), and Brewer's sparrow (*Spizella breweri*) (USFWS 2021). These species are also considered to be special status species; they are discussed in more detail in the Biological Resources Supplemental Environmental Report (BLM 2024d).

The land bird initiative known as Partners-In-Flight has developed a series of bird conservation plans for regions covering every state. Partners-In-Flight bird conservation regions (BCRs) are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. BCRs are a hierarchical framework of nested ecological units. The overall goal of BCRs is to accurately identify the migratory and resident bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities by ecoregion. The US Fish and Wildlife Service (USFWS) updates the BCR lists every 5 years. The Birds of Conservation Concern 2021 (USFWS 2021) is the most recent update. The USFWS recommends that the regional list of birds of conservation concern (BCCs) be consulted during project environmental reviews, in accordance with Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds.

The planning area is within the Sonoran and Mojave Deserts BCR (BCR 33) and is on the border of the Great Basin BCR (BCR 9). Twenty-seven BCCs are listed in the Sonoran and Mojave Deserts BCR, and 34 BCCs are listed in the Great Basin BCR (USFWS 2021). The USFWS Information for Planning and Consultation (IPaC) database query for the planning area identified one BCC—the pinyon jay (*Gymnorhinus cyanocephalus*)—that may occur in the planning area vicinity. **Table 3-4**, below, shows the one BCC identified by the IPaC database, its breeding status in the region, and its habitat requirements. Pinyon jay is also considered a BLM sensitive species; it is discussed in more detail in **Section 3.2.3**, Threatened, Endangered, and Special Status Species.

Table 3-4. Birds of Conservation Concern

Common Name	Scientific Name	Breeding Status	Habitat Requirements and Distribution
Pinyon jay	*Gymnorhinus cyanocephalus*	Breeds in the Great Basin region	It requires pinyon-juniper woodlands or less frequently other pines. In the nonbreeding season, it also occurs in scrub oak and sagebrush. Its nests are placed in shrubs or trees of pinyon, juniper, oak, or pine. It is a year-round resident in Nevada where pinyon pine occurs.

Source: USFWS IPaC (see Appendix D of the Biological Resources Supplemental Environmental Report [BLM2024d])

During field surveys of the Red Ridge 1 and Red Ridge 2 Solar project areas in 2022, biologists reported observations of three species of migratory birds: black-throated sparrow (*Amphispiza bilineata*), common raven (*Corvus corax*), and horned lark (*Eremophila alpestris*) (Stantec 2022a, 2022b, 2022c). While breeding behavior of these species was not observed in the Red Ridge 1 Solar project area, it was observed in the Red Ridge 2 Solar project area at two survey point locations: a pair of horned larks carrying grassy nesting material, and a territorial pair of black-throated sparrows delivering insects to a nest. The nest contained four nestlings (Stantec 2022b).

3.2.3 Threatened, Endangered, and Special Status Species

Special Status Plant Species

The BLM contacted the Nevada Division of Natural Heritage (NDNH) and queried the USFWS's IPaC database. The purpose of this coordination was to request information regarding special status plant species known to occur or having the potential to occur in the planning area.

The BLM queried the USFWS's IPaC database on February 5, 2024, to request information regarding threatened, endangered, proposed, and candidate plant species and critical habitat known to occur or having the potential to occur in the planning area. The USFWS IPaC report did not identify any threatened, endangered, proposed, or candidate plant-related resources or critical habitats in the planning area vicinity.

The NDNH response identified that two at-risk plant species have been recorded within the planning area vicinity:

- Candelaria blazingstar (*Mentzelia candelariae*)
- Squalid milkvetch (*Astragalus serenoi* var. *sordescens*)

The NDNH is currently tracking 290 plant species on the At-Risk Plant and Animal Tracking List (NDNH 2023a) and 94 plant species on the Plant and Animal Watch List (NDNH 2023b). Species on the tracking list are those species that the NDNH actively maintains inventories for; this includes compiling and mapping data, regularly assessing conservation status, and providing information for proactive planning efforts. These species typically have federal or other state agency status, and they are considered at highest risk of extirpation in the state.

Species on the watch list are those species that are considered to be of long-term concern. In some cases, these species are showing a declining trend, but overall, their population numbers are still robust; in other cases, the species may have recently been removed from the tracking list but are still being monitored in the event their status changes. The NDNH passively collects and maintains data on these species.

The NAC Chapter 527, Protection and Preservation of Timbered Lands, Trees, and Flora, includes a list of fully protected species of native flora (NAC 527.010).[3] This list includes critically endangered species of native flora that may not be removed or destroyed except pursuant to a permit issued by the state forester. The list includes 24 species that are typically restricted to specific rare or unique soil types and environmental conditions.

[3] Internet website: https://www.leg.state.nv.us/nac/NAC-527.html.

Habitat Evaluation and Survey Results

The BLM evaluated the potential for special status plant species to occur in the planning area. This evaluation was based on the results of:

- A desktop habitat evaluation for the planning area, including review of the following resources:
  - Natural Resources Conservation Service (NRCS) soil map units and ecological sites
  - US Geological Survey Southwest Regional Gap Analysis Project (SWReGAP) landcover types and topographic maps
  - Aerial imagery available on Google Earth
- Descriptions of known habitat requirements and distribution ranges of special status plant species available from the NDNH (2023c), Flora of North American (FNA 2023), and NatureServe Explorer (NatureServe 2023)
- Locations of documented collections of special status plant species as cataloged in the Intermountain Region Herbarium Network (IRHN 2023)
- Results of special status plant habitat assessments that have been carried out for the Lone Mountain Solar project (NewFields 2022a) and Smoky Valley Solar project (BEC 2023)
- Results of special status plant surveys that have been carried out in the Esmeralda Energy Center project area (Bio-logical 2022), Lone Mountain Solar project area (NewFields 2022a), Red Ridge 1 Solar and Red Ridge 2 Solar project areas (Stantec 2022a), and Smoky Valley Solar project area (SWCA 2023)

To conduct the habitat evaluation, the BLM compared the conditions in the planning area with the ranges and habitat requirements of the BLM sensitive species for the Battle Mountain District (IM-NV-2024-003, https://www.blm.gov/policy/nv-im-2024-003), the list of State of Nevada fully protected species (NAC 527.270), and the NDNH tracked and watched species that have been documented in the planning area vicinity. For each species, suitable habitat determinations are based on a combination of an assessment of the species' known range and the vegetation communities, elevations, slope and aspect, substrate type, disturbance history (for example, fire history and past development), or other relevant habitat features. The conditions in the planning area were assessed using the desktop resources above and from results of existing assessments and surveys that have been carried out in the planning area to date.

The range assessment for special status species was generated from the NDNH species explorer (http://species.heritage.nv.gov/; this application draws on information from the Nevada Rare Plant Atlas [Morefield 2001]), observations documented in the Intermountain Region Herbarium Network (https://intermountainbiota.org/portal/index.php), and ranges published in relevant primary literature.

Table 3-5, below, summarizes the special status plant species that were determined to have the potential to occur within the planning area, based on their geographic distribution and habitat requirements. Based on the similarity of habitats across the planning area, this evaluation was made planning area–wide and was not made for the individual project areas, unless otherwise noted in the discussions by species, below. This table also summarizes the special status plant species that have been observed in the planning area during surveys carried out to date. The general locations of observations made to date are disclosed in the discussions by plant species, below.

Table 3-5. Special Status Plant Species

Common Name	Scientific Name	Status[1]	Determination
Alkali ivesia	*Ivesia kingii* var. *kingii*	NAC	Potential to occur
Beatley's buckwheat	*Eriogonum beatleyae*	BLM S	Potential to occur
Blaine pincushion	*Sclerocactus blainei*	BLM S	Potential to occur
Candelaria blazingstar	*Mentzelia candelariae*	BLM S	Potential to occur
Cima milkvetch	*Astragalus cimae* var. *cimae*	BLM S	Potential to occur
Currant milkvetch	*Astragalus uncialis*	BLM S	Potential to occur
Eastwood milkweed	*Asclepias eastwoodiana*	BLM S	**Present**
Mojave fishhook cactus	*Sclerocactus polyancistrus*	AR	Potential to occur
Holmgren lupine	*Lupinus holmgrenianus*	BLM S	Potential to occur
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	BLM S	Potential to occur
Limestone monkeyflower	*Erythranthe calcicole*	BLM S	Potential to occur
Mojave thistle	*Cirsium mohavense* (*C. virginense*)	BLM S	Potential to occur
Nevada dune beardtongue	*Penstemon arenarius*	BLM S	Potential to occur
Nye pincushion cactus	*Sclerocactus nyensis*	BLM S	Potential to occur
Railroad Valley globemallow	*Sphaeralcea caespitosa* var. *williamsiae*	BLM S	Potential to occur
Reese River phacelia	*Phacelia glaberrima*	BLM S	Potential to occur
Sagebrush (Sand) cholla	*Grusonia pulchella*	BLM S	**Present**
Squalid milkvetch	*Astragalus serenoi* var. *sordescens*	AR	Potential to occur
Tonopah milkvetch	*Astragalus pseudiodanthus*	BLM S	Potential to occur
Watson spinecup	*Oxytheca watsonii*	BLM S	Potential to occur
West Humboldt buckwheat	*Eriogonum anemophilum*	BLM S	Potential to occur

Source: Habitat Evaluation Table (see **Appendix B**)
Notes:
[1] Status codes are as follows:
BLM S = BLM sensitive species
AR = NDNH at-risk species
NAC = fully protected species of native flora (NAC 527.010)

It is important to note that assessments and surveys for special status plants have not been conducted throughout the entire planning area to date; rather, several individual project proponents have carried out assessments and surveys within the individual project boundaries in the planning area. These include special status plant habitat assessments for the Lone Mountain Solar project (NewFields 2022a) and Smoky Valley Solar project (BEC 2023), and special status plant surveys in the Esmeralda Energy Center project area (Bio-logical 2022), Lone Mountain Solar project area (NewFields 2022a), Red Ridge 1 and 2 Solar project areas (Stantec 2022a), and Smoky Valley Solar project area (SWCA 2023).

The results from the existing assessments and surveys, listed above, were used to inform the planning area–wide habitat evaluation. Also, results of the individual existing surveys are not necessarily representative of the conditions in the wider planning area. For example, special status plants observed in a particular project area do not indicate that special status plants are limited to only that project area.

Conversely, special status plants that have not been detected during surveys to date should not be assumed to be absent from the planning area, as suitable[4] or occupied[5] habitat may exist in un-surveyed areas.

[4] Suitable habitat is defined by the presence of suitable conditions for the target species.
[5] Occupied habitat is defined by the presence of the target species.

Further, the results of the surveys that have been carried out in portions of the planning area to date must be viewed in the context of the prevailing climatological conditions leading up to the surveys. Precipitation leading up to spring 2022 was below average, which may have reduced, or precluded, detectability of certain special status plants during surveys conducted in spring 2022. For example, typical spring annual plants were not observed during surveys in the Lone Mountain Solar project area; this reduced the total number of plant taxa observed in this project area, and many of the annual species observed were identified from the dried remains of plants from past growing seasons (NewFields 2022a). Further, botanists that conducted surveys in the Esmeralda Energy Center project area noted that drought and climate conditions were not favorable for detection of Nye pincushion cactus, a special status cactus that the botanists searched for during surveys (Bio-logical 2022). Thus, even in project areas where surveys for special status plants have been carried out, negative survey results do not necessarily indicate an absence of special status plants in the planning area.

Similarly, special status plant observations to date may not be representative of the species' entire distribution in the planning area. For example, botanists noted that low soil moisture due to zero rainfall preceding the survey period may have contributed to low emergence of Eastwood milkweed in the Esmeralda Energy Center project area and subsequent low rates of detection (Bio-logical 2022).

Special status plant species with the potential to occur in the planning area, and that have been observed in individual project areas within the planning area, are described further in the Biological Resources Supplemental Environmental Report (BLM 2024d).

Special Status Wildlife Species

The BLM contacted the Nevada Department of Wildlife (NDOW) and NDNH and queried the USFWS's IPaC database. The purpose of this coordination was to request information regarding special status wildlife species known to occur or having the potential to occur in the planning area.

The USFWS's IPaC database search identified one federally listed endangered, one proposed listed threatened, and one candidate species that the proposed projects could affect; these are the southwestern willow flycatcher (*Empidonax traillii extimus*, endangered), greater sage-grouse (*Centrocercus urophasianus* bistate population, proposed threatened), and monarch butterfly (*Danaus plexippus*, candidate). There is proposed critical habitat for the greater sage-grouse bistate population and final critical habitat for the southwestern willow flycatcher, but none is in the planning area vicinity. Additionally, the planning area falls within the southwestern willow flycatcher's migratory range. However, there is no suitable habitat within the planning area; therefore, species occurrence is unlikely.

The NDNH response identified that two at-risk wildlife species have been recorded within the planning area vicinity:

- Golden eagle
- Pale kangaroo mouse (*Microdipodops pallidus*)

The NDOW response letter stated that raptor nests have been recorded in the planning area vicinity; also, the planning area is near abandoned mine workings that often provide habitat for special status wildlife species, especially bats.

Habitat Evaluation and Survey Results

The BLM evaluated the potential for special status wildlife species to occur in the planning area. This evaluation was based on the results of the following special status wildlife and habitat assessments and surveys that have been carried out in the planning area to date:

- Results of habitat assessments that have been carried out for the Lone Mountain Solar project (NewFields 2022a) and Smoky Valley Solar project (BEC 2023)
- An avian point-count survey for the Lone Mountain Solar project (NewFields 2022b)
- Migratory bird point-count surveys, burrowing owl surveys, and pale kangaroo mouse surveys for the Red Ridge 1 and Red Ridge 2 Solar projects (Stantec 2022b–2022g).

To conduct the habitat evaluation, the BLM compared the conditions in the planning area with the ranges and habitat requirements of the BLM sensitive species for the Battle Mountain District, the list of State of Nevada fully protected wildlife species (NAC 503.030 through 503.080), and the NDNH tracked and watched species that have been documented in the planning area vicinity. For each species, suitable habitat determinations are based on a combination of an assessment of the species' known range and the vegetation communities, elevations, slope and aspect, substrate type, disturbance history (for example, fire history and past development), or other relevant habitat features.

Table 3-6, below, summarizes the special status wildlife species that were determined to have the potential to occur within the planning area, based on their geographic distribution and habitat requirements. Based on the similarity of habitats across the planning area, this evaluation was made planning area–wide and was not made for the individual project areas, unless otherwise noted in the discussions by species. This table also summarizes the special status wildlife species that have been observed in the planning area during surveys carried out to date.

Table 3-6. Special Status Wildlife Species

Taxa	Common Name	Scientific Name	Status[1]	Determination
Reptiles	Greater short-horned lizard	*Phrynosoma hernandesi*	BLM S	Potential to occur
Birds	Bald eagle	*Haliaeetus leucocephalus*	BLM S; SP	Potential to occur
	Black-chinned sparrow	*Spizella atrogularis*	BLM S	Potential to occur
	Black rosy-finch	*Leucosticte atrata*	BLM S	Potential to occur
	Brewer's sparrow	*Spizella breweri*	BLM S	Potential to occur
	Burrowing owl (includes western burrowing owl)	*Athene cunicularia* (*A. c. hypugaea*)	BLM S	Potential to occur
	Common nighthawk	*Chordeiles minor*	BLM S	Potential to occur
	Ferruginous hawk	*Buteo regalis*	BLM S	Potential to occur
	Golden eagle	*Aquila chrysaetos*	BLM S; SP	Potential to occur
	Gray-crowned rosy-finch	*Leucosticte tephrocotis*	BLM S	Potential to occur
	Greater sage-grouse (bistate population)	*Centrocercus urophasianus*	BLM S; SP	Potential to occur
	Le Conte's thrasher	*Toxostoma lecontei*	BLM S	Potential to occur
	Loggerhead shrike	*Lanius ludovicianus*	BLM S; SP	Potential to occur
	Peregrine falcon	*Falco peregrinus*	BLM S; SP	Potential to occur
	Pinyon jay	*Gymnorhinus cyanocephalus*	BLM S; BCC	Potential to occur
	Sagebrush sparrow	*Artemisiospiza nevadensis*	BLM S	Potential to occur

Taxa	Common Name	Scientific Name	Status[1]	Determination
Birds *(cont.)*	Western snowy plover (not including the Pacific coast distinct population segment)	*Charadrius alexandrinus*	BLM S	Potential to occur
Mammals (Bats)	Big brown bat	*Eptesicus fuscus*	SP	Potential to occur
	Mexican free-tailed bat	*Tadarida brasiliensis*	BLM S; SP	Potential to occur
	California myotis	*Myotis californicus*	BLM S	Potential to occur
	Canyon bat	*Parastrellus hesperus*	BLM S	Potential to occur
	Fringed myotis	*Myotis thysanodes*	BLM S; SP	Potential to occur
	Long-legged myotis	*Myotis volans*	BLM S	Potential to occur
	Pallid bat	*Antrozous pallidus*	BLM S; SP	Potential to occur
	Townsend's big-eared bat	*Corynorhinus townsendii*	BLM S; SP	Potential to occur
	Western small-footed myotis	*Myotis ciliolabrum*	BLM S; SP	Potential to occur
	Yuma myotis	*Myotis yumanensis*	BLM S; SP	Potential to occur
Mammals (Other than Bats)	Bighorn sheep	*Ovis canadensis* spp. (includes Rocky Mountain bighorn sheep [*O. c. canadensis*], California bighorn sheep [*O. c. californiana*], and desert bighorn sheep [*O. c. nelsoni*])	BLM S; SP	Potential to occur
	Dark kangaroo mouse	*Microdipodops megacephalus* ssp. (includes Desert Valley kangaroo mouse [*M. m albiventer*] and Fletcher dark kangaroo mouse [*M. m. nasutus*])	BLM S; SP	Potential to occur
	Desert kangaroo rat	*Dipodomys deserti*	BLM S	Potential to occur
	Pale kangaroo mouse	*Microdipodops pallidus*	BLM S; SP	Potential to occur
	Panamint kangaroo rat	*Dipodomys panamintinus*	BLM S	Potential to occur
Invertebrates	Big Smoky wood nymph	*Cercyonis oetus alkalorum*	BLM S	Potential to occur
	Darkling beetle	*Neobaphion papula*	BLM S	Potential to occur
	Inyo Mountains blue	*Euphilotino inyomontana*	BLM S	Potential to occur
	Monarchy butterfly	*Danaus plexippus*	FC; BLM S	Potential to occur
	Nevada alkali skipperling	*Pseudocopaeodes eunus flavus*	BLM S	Potential to occur
	Pallid skipper	*Polites sabuleti basinensis*	BLM S	Potential to occur

Source: Habitat Evaluation Table (see **Appendix B**)
Notes:
[1] Status codes are as follows:
BLM S = BLM sensitive species
FC = federal candidate for listing
SP = state protected
BCC = USFWS bird of conservation concern

Special status wildlife species with the potential to occur in the planning area, and that have been observed in individual project areas within the planning area, are described further in the Biological Resources Supplemental Environmental Report (BLM 2024d).

3.2.4 Vegetation

SWReGAP Land Cover Types

The acres of the SWReGAP land cover types in the individual project areas and larger planning area are summarized in **Table 3-7**, below. Descriptions of the land cover types follow the table. The land cover types are developed using remote-sensing techniques, which can result in inaccuracies on a fine scale. However, the data were used because the data cover the entire planning area and provide a general understanding of the major vegetation communities, including relevant biophysical information for each community. **Figure 3-1**, SWReGAP Land Cover Types, **Appendix A**, depicts the SWReGAP land cover types in the project areas and planning area.

Table 3-7. SWReGAP Land Cover Types

Land Cover Type	Project Areas (Acres and Percentage of the Project Area)							Planning Area (Acres and Percentage of the Planning Area)
	EEC	GDS	LMS	NS	RR1	RR2	SVS	
Inter-Mountain Basins Big Sagebrush Shrubland	70 (1%)	—	—	—	<10 (<1%)	<10 (<1%)	—	70 (<1%)
Inter-Mountain Basins Mixed Salt Desert Scrub	8,290 (99%)	10,670 (64%)	7,700 (92%)	3,550 (43%)	6,160 (100%)	6,850 (100%)	2,270 (46%)	45,500 (76%)
Inter-Mountain Basins Greasewood Flat	—	4,790 (29%)	410 (5%)	1,840 (22%)	20 (<1%)	—	1,920 (39%)	8,980 (15%)
Inter-Mountain Basins Semi-Desert Shrub Steppe	—	90 (1%)	20 (<1%)	<10 (<1%)	—	<10 (<1%)	<10 (<1%)	120 (<1%)
Inter-Mountain Basins Playa	—	920 (6%)	200 (2%)	2,860 (35%)	—	—	700 (14%)	4,670 (8%)
Inter-Mountain Basins Active and Stabilized Dune	—	90 (1%)	<10 (<1%)	<10 (<1%)	—	—	—	100 (<1%)
Invasive Annual and Biennial Forbland	—	20 (<1%)	—	—	—	—	—	20 (<1%)
North American Arid West Emergent Marsh	—	30 (<1%)	—	—	—	—	—	30 (<1%)
Barren Lands, Non-specific	—	110 (1%)	10 (<1%)	20 (<1%)	<10 (<1%)	10 (<1%)	—	150 (<1%)

Sources: BLM GIS 2023; USGS 2005
Notes:
Acres are rounded to the nearest 10.
Solar project name codes are as follows:
EEC = Esmeralda Energy Center
GDS = Gold Dust Solar
LMS = Lone Mountain Solar
NS = Nivloc Solar
RR1 = Red Ridge 1 Solar
RR2 = Red Ridge 2 Solar
SVS = Smoky Valley Solar

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the western US, typically in broad basins between mountain ranges, in plains, and in foothills between about 4,900 and 7,500 feet elevation. Soils are typically deep, well drained, and nonsaline. These shrublands are dominated by basin big sagebrush (*Artemisia tridentata* ssp. *Tridentata*) and/or Wyoming big sagebrush (*Artemisia tridentata* ssp. *Wyomingensis*). Scattered juniper (*Juniperus* spp.), greasewood, and saltbush (*Atriplex* spp.) may be present in some stands. Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may codominate disturbed stands. Perennial herbaceous components typically contribute less than 25 percent vegetation cover.

Inter-Mountain Basins Mixed Salt Desert Scrub

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the intermountain western US. Substrates are often saline, calcareous, medium- to fine-textured, alkaline soils; however, they include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more saltbush species, such as shadscale, fourwing saltbush, cattle saltbush (*Atriplex polycarpa*), or spinescale saltbush (*Atriplex spinifera*). Other shrubs present to codominate may include Wyoming big sagebrush, yellow rabbitbrush, rubber rabbitbrush, Nevada jointfir (*Ephedra nevadensis*), spiny hopsage, winterfat, wolfberry, bud sagebrush (*Picrothamnus desertorum*), or horsebrush.

Greasewood is generally absent; if it is present, however, it does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids. Various forbs are also present.

Inter-Mountain Basins Greasewood Flat

This ecological system occurs throughout much of the western US in intermountain basins. It typically occurs near drainages on stream terraces and flats, or it may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table; they flood intermittently but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by greasewood. Fourwing saltbush, shadscale, or winterfat may be present to codominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids, including alkali sacaton (*Sporobolus airoides*), saltgrass (*Distichlis spicata* [where water remains ponded the longest]), or common spikerush (*Eleocharis palustris*).

Inter-Mountain Basins Semi-Desert Shrub Steppe

This ecological system occurs throughout the intermountain western US, typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semiarid shrub steppe is typically dominated by graminoids (over 25 percent cover) with an open shrub layer. Characteristic grasses include Indian ricegrass, blue grama (*Bouteloua gracilis*), saltgrass, needle-and-thread grass (*Hesperostipa comata*), James' galleta (*Pleuraphis jamesii*), Sandberg bluegrass (*Poa secunda*), and alkali sacaton (*Sporobolus airoides*). The woody layer is often a mixture of shrubs and dwarf shrubs. Characteristic species include fourwing saltbush, big sagebrush, Greene's rabbitbrush (*Chrysothamnus greenei*), yellow rabbitbrush, ephedra, rubber rabbitbrush, broom snakeweed (*Gutierrezia sarothrae*), and winterfat. Big sagebrush may be present, but it does not dominate.

Inter-Mountain Basins Playa

This ecological system is composed of barren and sparsely vegetated playas (generally less than 10 percent plant cover) found in the Intermountain West. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil sub-horizon; it is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects the species composition. Characteristic species may include iodinebush (*Allenrolfea occidentalis*), black greasewood, spiny hopsage, Lemmon's alkaligrass (*Puccinellia lemmonii*), basin wildrye (*Leymus cinereus*), saltgrass, and saltbushes. A relatively large, dry playa lake borders the northern boundary of the planning area. This is the Big Smoky Valley playa. This feature may flood during periods of substantial rainfall and provide unique habitat for some species.

Inter-Mountain Basins Active and Stabilized Dune

This ecological system occurs in Intermountain West basins and is composed of unvegetated to moderately vegetated (about 10 to 30 percent plant cover) active and stabilized dunes and sand sheets. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand); the species form patchy or open grasslands, shrublands, or steppe composed of Indian ricegrass, basin big sagebrush, fourwing saltbush, ephedra, blackbrush, rubber rabbitbrush, chokecherry (*Prunus virginiana*), lemon scurfpea (*Psoralidium lanceolatum*), antelope bitterbrush, alkali sacaton, fourpart horsebrush (*Tetradymia tetrameres*), or crinklemat (*Tiquilia* spp.).

Invasive Annual and Biennial Forbland

This land cover type includes areas that are dominated by introduced annual and biennial forb species, such as saltlover, kochia, and Russian thistle (*Salsola* spp.).

North American Arid West Emergent Marsh

This widespread ecological system occurs throughout much of the arid and semiarid regions of western North America. Natural marshes may occur in depressions in the landscape (ponds and kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers. Marshes are frequently or continually inundated. The water chemistry may include some alkaline or semi-alkaline situations. The vegetation is characterized by herbaceous plants that are adapted to saturated soil conditions. Common emergent vegetation includes species of bulrush (*Scirpus* spp. and *Schoenoplectus* spp.), cattail (*Typha* spp.), rush (*Juncus* spp.), and others. The Gold Dust Solar project area contains about 30 acres of this land cover type. This is the only place in the planning area where this land cover type is found.

The planning area contains numerous ephemeral washes, which are very common to the desert Southwest. These washes flow only in response to rainfall and are completely dewatered when precipitation or floods are absent. While washes can provide riparian habitat that is different from the adjacent uplands, neither aerial imagery nor vegetation maps indicate that washes in the planning area provide such habitat. Additionally, a relatively large, dry lake borders the northern boundary of the planning area. This is the Big Smoky Valley playa, as discussed under *Inter-Mountain Basins Playa*, above. These features are discussed in more detail in the Hydrologic Resources Supplemental Environmental Report (BLM 2024f).

Further, a small area associated with a livestock corral that includes a well and one or more stock tanks is in the Smoky Valley Solar project area (BEC 2023). A review of available aerial imagery from various seasons over multiple years indicates herbaceous, emergent vegetation with some larger shrub species present in these areas at the time of the imagery. Additionally, it appears water is being allowed to overflow the stock tanks and drain into downgradient washes; however, it was not obvious in previous imagery. No wetlands are present within or near this corral, or in other areas of the Smoky Valley Solar project area (BEC 2023).

Barren Lands, Non-specific

These are barren areas where vegetation accounts for less than 15 percent of the total cover.

Ecological Sites

The BLM used the US Department of Agriculture NRCS soil survey (NRCS 2023a) to determine the ecological sites present in the planning area. An ecological site is a distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in the land's ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to management actions and natural disturbances. Ecological site descriptions synthesize information and data pertaining to the soils, hydrology, ecology, and management of the ecological site.

Table 3-8, below, summarizes the ecological sites in the individual project areas and larger planning area. Descriptions of the ecological sites follow the table. Ecological site descriptions are available from the US Department of Agriculture NRCS Ecosystem Dynamics Interpretive Tool.[6]

Table 3-8. Ecological Sites

Ecological Site Descriptor	Ecological Site Name	Project Areas (Acres and Percentage of the Project Area)							Planning Area (Acres and Percentage of the Planning Area)
		EEC	GDS	LMS	NS	RR1	RR2	SVS	
R029XY041NV	Dry Wash	180 (2%)	11,770 (70%)	1,460 (17%)	2,450 (30%)	—	—	2,960 (61%)	18,810 (32%)
R027XY043NV / R029XY039NV	Coarse Gravelly Loam 3-5 P.Z.	5,750 (69%)	—	—	—	—	5,330 (78%)	—	11,070 (19%)
R029XY087NV	Gravelly Loam 5-8 P.Z.	2,350 (28%)	—	3,480 (42%)	60 (1%)	4,030 (65%)	480 (7%)	30 (1%)	10,430 (17%)
R029XY063NV	Dry Sodic Terrace	—	1,060 (6%)	420 (5%)	2,940 (36%)	—	—	500 (10%)	4,910 (8%)
R029XY033NV	Loamy Slope 3-5 P.Z.	70 (1%)	500 (3%)	2,450 (29%)	20 (<1%)	580 (9%)	40 (1%)	—	3,660 (6%)
R029XY018NV	Sodic Dune	—	1,680 (10%)	—	390 (5%)	—	—	1,140 (23%)	3,220 (5%)
N/A	Unclassified	10 (<1%)	250 (1%)	280 (3%)	1,160 (14%)	240 (4%)	1,010 (15%)	200 (4%)	3,150 (5%)
R029XY002NV	Saline Meadow	—	800 (5%)	—	1,220 (15%)	—	—	60 (1%)	2,090 (4%)
R029XY036NV	Cobbly Loam 5-8 P.Z.	—	<10 (<1%)	—	—	1,340 (22%)	—	—	1,340 (2%)
R029XY046NV	Sandy Loam 5-8 P.Z.	—	650 (4%)	—	—	—	—	—	650 (1%)
R029XY017NV	Loamy 5-8 P.Z.	—	—	160 (2%)	—	—	—	—	160 (<1%)
R029XY024NV	Sodic Terrace 5-8 P.Z.	—	—	100 (1%)	40 (<1%)	—	—	—	140 (<1%)

Sources: BLM GIS 2023; NRCS 2023a
Notes:
Acres are rounded to the nearest 100.

[6] Internet website: https://edit.jornada.nmsu.edu/

Solar project name codes are as follows:
EEC = Esmeralda Energy Center
GDS = Gold Dust Solar
LMS = Lone Mountain Solar
NS = Nivloc Solar
RR1 = Red Ridge 1 Solar
RR2 = Red Ridge 2 Solar
SVS = Smoky Valley Solar

Dry Wash

This ecological site occurs on drainage ways, channels, and inset fans having intermittent water courses. Slopes range from 0 to 15 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 3,900 to about 6,300 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 5 to 8 inches. This site receives additional moisture by flooding due to its occurrence in drainageways and inset fans. The soils associated with this site are very deep alluvium from mixed rock sources. They are quite variable as they continue to be reworked by water. These soils typically have high amounts of gravels and cobbles distributed throughout the soil profile as well as at the surface. This site is frequently disturbed by intense, natural flood flows.

The reference plant community is unstable but is usually dominated by rubber rabbitbrush, fourwing saltbush, Indian ricegrass, and burrobrush (*Hymenoclea salsola*). Other important species are littleleaf horsebrush (*Tetradymia glabrata*), Bailey's greasewood, Nevada jointfir, and Shockley's wolfberry (*Lycium shockleyi*). The potential vegetation composition is about 20 percent grasses, 10 percent forbs, and 70 percent shrubs. The approximate ground cover is 6 to 12 percent.

Coarse Gravelly Loam 3-5 P.Z.

This ecological site occurs on lower fan piedmonts and inset fans. Slopes range from 0 to 15 percent, but slope gradients of 2 to 4 percent are typical. Elevations are 4,000 to about 5,400 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 3 to 5 inches. This site receives additional moisture as it runs in from higher landscapes. The soils associated with this site have formed in alluvium from mixed rock sources and are very deep. Surface soils are medium to moderately coarse textured and are typically gravelly to very gravelly.

The reference plant community is dominated by Indian ricegrass and shadscale. Other important species on this ecological site are white bursage, Shockley's wolfberry, and Bailey's greasewood. The potential vegetation composition is about 10 percent grasses, 5 percent forbs, and 85 percent shrubs. The approximate ground cover is 15 to 25 percent.

Gravelly Loam 5-8 P.Z.

This ecological site occurs on piedmont slopes, inset fans, fan remnants, fan skirts, alluvial flats, and hillsides. Slopes range from 0 to 30 percent, but slope gradients of 2 to 8 are most typical. Elevations are 4,100 to 7,000 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 5 to 8 inches. The soils associated with this site are predominantly very deep. These soils are well drained and are formed in mixed alluvium. The soil surface is moderately coarse in texture, and the soils are neutral to strongly alkaline.

The reference plant community is dominated by Bailey's greasewood, shadscale, and Indian ricegrass. Other important species associated with this site are galleta and bud sagebrush. The potential vegetation composition is about 45 percent grasses, 5 percent forbs, and 50 percent shrubs. The approximate ground cover is 15 to 25 percent. Bare ground is approximately 35 to 50 percent. Within plant interspaces, litter is less than 3 percent cover.

Dry Sodic Terrace

This ecological site occurs on fan skirts, beach terraces, and alluvial flats. Slopes range from 0 to 8 percent, but slope gradients of 2 to 4 percent are most typical. Elevations are 4,000 to 5,700 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 3 to 7 inches. The soils associated with this ecological site have formed in alluvium from mixed sources; they are very deep and well drained to somewhat excessively drained. Soils are coarse textured with variable amounts of rock fragments on the surface. Reaction is moderately to strongly alkaline.

The reference plant community is dominated by shadscale, black greasewood, and Bailey's greasewood. The potential vegetation composition is about 15 percent grasses, 5 percent forbs, and 80 percent shrubs. The approximate ground cover is less than 10 percent.

Loamy Slope 3-5 P.Z.

This ecological site occurs on summits and side slopes of fan piedmonts, rock pediments, hills, mountains, and fan remnants on all aspects. Slopes range from 4 to 75 percent, but slope gradients of 8 to 75 percent are typical. Elevations are 4,200 to about 6,800 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 3 to 5 inches. The soils of this ecological site are typically very shallow to shallow, well drained to somewhat excessively drained, and typically calcareous or carbonatic. The soils are formed in volcanic rocks or tuffaceous sedimentary rocks. There are high amounts of rock fragments on the soil surface and in the profile. Soil surface textures are generally loams to sandy loams.

The reference plant community is dominated by shadscale. Bailey's greasewood and Nevada dalea (*Psorothamnus polydenius*) are important species associated with this site. The potential vegetation composition is about 10 percent grasses, 5 percent forbs, and 85 percent shrubs. The approximate ground cover is less than 5 percent.

Sodic Dune

This ecological site occurs on partially stabilized sand dunes. Slopes range from 2 to 16 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 4,500 to about 6,300 feet. The climate associated with this site is semiarid, characterized by cold, moist winters and warm, somewhat dry summers. The average annual precipitation is 5 to 8 inches. The soils associated with this site are windblown fine sands, typically more than 40 inches in depth.

The reference plant community is dominated by black greasewood and Indian ricegrass. Other important species on this ecological site are needle-and-thread grass and fourwing saltbush. The potential vegetation composition is about 30 percent grasses, 10 percent forbs, and 60 percent shrubs. The approximate ground cover is 10 to 20 percent.

Saline Meadow

This ecological site occurs on alluvial flats, lake plains, and stream floodplains, on slope gradients of 0 to 2 percent. Elevations are between 3,500 and 5,500 feet. The soils in this site are deep to very deep and poorly drained with water tables near or at the surface in the early spring; the soils are moderately to strongly affected by salts. The reference plant community is dominated by alkali sacaton, saltgrass, and Baltic rush (*Juncus balticus*). The potential vegetation composition is about 85 percent grasses, 10 percent forbs, and 5 percent shrubs.

Cobbly Loam 5-8 P.Z.

This ecological site occurs on lower piedmont slopes, rock pediments, inset fans, and fan remnants. Slopes range from 0 to over 30 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 4,100 to about 7,000 feet. The soils associated this site are very shallow to very deep and well drained to excessively drained. These soils have formed in mixed alluvium from mixed sources, including volcanic rocks. Surfaces are stony or very cobbly with loam textures. Subsoils may have a restrictive layer within the main rooting depth.

The reference plant community is dominated by spiny menodora (*Menodora spinescens*) and Indian ricegrass. Bailey's greasewood, shadscale, Nevada jointfir, and galleta are other important species associated with this site. The potential vegetation composition is about 20 percent grasses, 5 percent forbs, and 75 percent shrubs. The approximate ground cover is 4 to 12 percent.

Sandy Loam 5-8 P.Z.

This ecological site occurs on inset fans and on axial-stream[7] floodplains of basin floors. Slopes range from 0 to 15 percent, but slope gradients of 0 to 8 percent are typical. Elevations are 4,400 to about 7,000 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 5 to 8 inches. The soils of this site are typically deep to very deep and well to excessively well drained. These soils have coarse-textured surfaces (sandy loams and loamy sands).

The reference plant community is dominated by fourwing saltbush, winterfat, and Indian ricegrass. Other important species for this site are spiny hopsage, bud sagebrush, galleta, sand dropseed, and spike dropseed. The potential vegetation composition is about 45 percent grasses, 5 percent forbs, and 50 percent shrubs. The approximate ground cover is 15 to 25 percent.

Loamy 5-8 P.Z.

This ecological site occurs on piedmont slopes, fan skirts, inset fans, fan remnants, and alluvial plains on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 8 percent are most typical. Elevations are 3,100 to 7,000 feet. The soils associated with this site are typically very shallow to very deep and well drained. Surface layers are usually gravelly or very gravelly and have less than 20 percent clay.

The reference plant community is dominated by shadscale, bud sagebrush, and Indian ricegrass. Other important species are galleta, winterfat, and bottlebrush squirreltail. The potential vegetation composition

[7] The main stream of an intermontane valley, flowing in the deepest part of the valley and parallel to the valley's longest dimension

is about 45 percent grasses, 5 percent forbs, and 50 percent shrubs. The approximate ground cover is 15 to 25 percent.

Sodic Terrace 5-8 P.Z.

This ecological site occurs on alluvial plains and flats, fan skirts, lake plain terraces, and stream terraces. Slopes range from 0 to 8 percent, but slope gradients of 0 to 4 percent are most typical. Elevations are 3,500 to about 6,600 feet. The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. The average annual precipitation is 5 to 8 inches. The soils associated with this site are very deep and moderately well to excessively drained. Surface soils are medium to moderately coarse textured and less than 10 inches thick. These soils are strongly to very strongly salt and sodium affected within 10 inches of the surface. A seasonal water table forms in these soils below depths of 5 feet that can supply additional moisture to deep-rooted shrubs. The surface layer normally crusts and bakes upon drying; this inhibits water infiltration and seedling emergence.

The reference plant community is dominated by shadscale, black greasewood, and Indian ricegrass. Other important species on this ecological site are bud sagebrush, fourwing saltbush, and bottlebrush squirreltail (*Elymus elymoides*). The potential vegetation composition is about 15 percent grasses, 5 percent forbs, and 80 percent shrubs. The approximate ground cover is 10 to 20 percent.

3.2.5 Wildlife

Big Game

Big game species are supported by the diversity of habitat and availability of essential resources throughout the planning area. The success of big game species can be attributed to habitat conditions, the availability of resources, and the level of human-disturbance activities. There are critical periods during an animal's life cycle when they are particularly vulnerable to disturbances related to human activities. Degradation or unavailability of certain habitats will lead to significant declines in carrying capacity and/or numbers of wildlife species in question. An example of this is winter range, where big game species migrate to lower elevations and can compete for limited resources, which can limit big game populations.

Occupied bighorn sheep and mule deer distribution exists near the planning area, as described in more detail in the Biological Resources Supplemental Environmental Report (BLM 2024d). Although occupied pronghorn habitat is not mapped, pronghorn are present year-round in the planning area vicinity. There is no known occupied elk distribution in the planning area vicinity (BEC 2023). Year-round habitat is present in the planning area for mule deer and bighorn sheep; this is discussed in further detail in the Biological Resources Supplemental Environmental Report (BLM 2024d).

Other Mammals

The most common species of mammals found in proximity to the planning area include a variety of rodents, the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), kit fox (*Vulpes macrotis*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), and mountain lion (*Puma concolor*) (NDOW 2022).

Fourwing saltbush provides valuable habitat and year-round browse and shelter for small mammals. Additionally, the browse provides a source of water for black-tailed jackrabbits in arid environments. A number of rodents inhabiting desert rangelands show preference for Indian ricegrass seed. Indian ricegrass is an important component of jackrabbit diets in spring and summer. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. Rodents and other small mammals use structural features, such as rocks and snags, to hide from predators and to avoid extreme temperatures. Species' distributions are influenced by vegetation, cover, elevation, soil, and other factors; many small mammals use features of sagebrush, grasslands, and pinyon-juniper vegetation.

Reptiles

There are a variety of snakes and lizards that are known either to occur or have the potential to occur within the planning area, in almost every habitat type. Likely species include the Great Basin collared lizard (*Crotaphytus bicinctores*), long-nosed leopard lizard (*Gambelia wislizenii*), western fence lizard (*Sceloporus occidentalis*), common sagebrush lizard (*Sceloporus graciosus*), horned lizard (*Phrynosoma* sp.), gopher snake (*Pituophis cateniferer*), and western rattlesnake (*Crotalus viridis*) (WAPT 2013).

According to the NDOW, common sagebrush lizard, desert horned lizard (*Phrynosoma platyrhinos*), desert striped whipsnake (*Masticophis taeniatus*), Great Basin fence lizard (*Sceloporus occidentalis longipes*), Great Basin gopher snake (*Pituophis catenifer deserticola*), greater short-horned lizard (*Phrynosomal hernandesi*), and long-nosed snake (*Rhinocheilus lecontei*) have been documented in the vicinity of the planning area.

Several of the lizard species documented in the planning area are considered special status species. These are discussed in more detail in the Biological Resources Supplemental Environmental Report (BLM 2024d).

Invertebrates

Insects provide important food sources for many species of wildlife, including birds, reptiles, small mammals, and other insects. Many insects common in sagebrush ecosystems are an important food source for adult and juvenile greater sage-grouse. There are thousands of species of insects in sagebrush, such as species in the Scarabeidae and Tenebrionidae (beetle) families, Formicidae (thatch ants) family, and Orthoptera (grasshopper) family, which are a high protein food source of many wildlife species (Klebenow and Gray 1968; Peterson 1970; Johnson and Boyce 1990; Pyle 1993; Drut et al. 1994). Additional details can be found in the Biological Resources Supplemental Environmental Report (BLM 2024d).

3.3 FORESTRY

Forest products, including native seeds and cactus species for collection, are available in the planning area. Collection of common desert plants and seeds is permitted by the 1997 Tonopah RMP and ROD (BLM 1997, p. 12). Native seed collection policies are described in BLM IM 2013-176, Seed Collection Policy and Pricing.[8] Per the IM, the BLM may issue a seed collection permit or contract if seed collection is deemed to be in conformance with the current land use plan, and it is adequately analyzed through the NEPA process. Mitigation measures, in the form of special permit stipulations, can be attached to a collection permit or contract. Per the 1997 Tonopah RMP and ROD (BLM 1997, p. 12), collection of live desert plants will not remove more than 10 percent of the existing canopy cover, though this limitation may be adjusted based on site evaluation and monitoring.

Seed harvest typically occurs in the late summer to early fall months, after vegetation has produced seed for the year. The highest level of demand for native seed from BLM-administered lands typically follows uncharacteristically severe or large wildfires, when seed is needed for stabilization and restoration of burned areas.

[8] Internet website: https://www.blm.gov/policy/im-2013-176.

Native vegetation communities provide opportunities for native seed collection in the planning area. The acres and plant composition of the native vegetation communities are summarized in **Section 3.2.4**, Vegetation. As shown in **Table 3-7**, mixed salt desert scrub and greasewood flat vegetation communities are prevalent throughout the planning area; therefore, native shrubs and perennial grasses and forbs typical of these communities likely provide the greatest opportunities for native seed collection.

Table 3-9 summarizes the cacti species observed in the planning area. Sand cholla (*Grusonia pulchella*), a BLM sensitive species and Nevada fully protected species, was also observed in the Red Ridge 1 and Red Ridge 2 project areas (Stantec 2022a). Because this is a sensitive species, it would not be available for collection, and it is not included in the table below. Yucca species have not been detected in the planning area to date, though surveys have not been conducted throughout the entire area.

The planning area lacks the vegetation communities that would support other forest product harvest or collection, including fuelwood, greenwood, fence posts, pine nuts, or Christmas trees.

Table 3-9. Cacti in the Planning Area

Common Name	Scientific Name	Present in the Project Area?[1]						
		EEC	GDS	LMS	NS	RR1	RR2	SVS
Wiggins cholla (Silver cholla)	*Cylindropuntia echinocarpa*	X	N/A	X	N/A	X	X	X
Strawberry hedgehog cactus	*Echinocereus engelmannii*	—	N/A	—	N/A	X	X	—
Beavertail cactus	*Opuntia basilaris*	X	N/A	X	N/A	X	X	—
Plains pricklypear	*Opuntia polyacantha*	—	N/A	X	N/A	X	X	—

Sources: BLM GIS 2023; Bio-logical 2022; NewFields 2022a; Stantec 2022a; BEC 2023; SWCA 2023
Notes:
[1] Field-based surveys have not been conducted to date in the Gold Dust Solar or Nivloc Solar project areas, so data are not available for these areas. N/A is used for these project areas.
Solar project name codes are as follows:
EEC = Esmeralda Energy Center
GDS = Gold Dust Solar
LMS = Lone Mountain Solar
NS = Nivloc Solar
RR1 = Red Ridge 1
RR2 = Red Ridge 2
SVS = Smoky Valley Solar

3.4 Cultural Resources

Cultural resources include precontact, ethnohistoric, and historic-era archaeological sites, and the locations of important events in the past. These resources 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 nonrenewable.

3.4.1 Overview

The planning area is in the western subarea of the Great Basin and situated in the Big Smoky Valley. It includes portions of Pleistocene Lake Tonopah. Archaeological evidence suggests that people have occupied the area beginning in the Paleoarchaic period (circa 13,000 to 7,700 years ago) through the Late Archaic period (up to circa 650 years ago). Following the Late Archaic is the Late Precontact period followed by the Ethnohistoric period. The latter focuses on post-contact history and nineteenth-century hunter-gatherers. The study area is within the traditional territory of the Western Shoshone.

Historic-era use of the area included transportation corridors and mining operations. Mining towns, including Blair Junction, the townsite that intersects one or more planned project areas, grew up around successful mining operations. Notable transportation activities include the construction of the Silver Peak Railroad and the Tonopah and Goldfield Railroad.

3.4.2 Project Survey Findings

Pursuant to Section 106 of the NHPA, the BLM must make a "reasonable and good faith effort" to identify historic properties that may be affected by implementation of the proposed project as a federal undertaking (36 CFR 800.4(b)(1)). The study area encompassed a total of 63,547 acres of BLM-administered lands. The project applicants conducted surveys of the project areas to determine the presence of historic properties. The areas surveyed in 2022 through 2024 consisted of the 59,650-acre project site, the 803-acre gen-tie corridor, and 154 acres of gen-tie roads.

The results of the seven Class III cultural resource inventory reports, which included an archival literature review, BLM Class III survey, and a visual assessment of the analysis area, are briefly summarized below.

Lone Mountain Solar Project (BLM Report No: 6-3371)

From June 6 to July 26, 2022, NewFields completed a Class III cultural resources inventory of approximately 8,700 acres for the Lone Mountain Solar project (formerly Leeward Esmeralda Solar Project) in Big Smoky Valley in Esmeralda County, Nevada (Gorczyk and Simpson 2022). The inventory resulted in the identification of 33 newly discovered archaeological sites and 8 previously documented sites. The sites include 12 precontact sites (one of which is a campsite and lithic scatter), 18 historic sites, and 3 multicomponent sites. Historic sites are mostly refuse dumps and historic linear features. Thirty-nine sites have been recommended as not eligible for listing on the NRHP. One site is a noncontributing element of an eligible resource. One site was previously determined eligible for the NRHP, and NewFields concurs with the original assessment. In addition to the 41 sites, 131 isolated finds were documented; these consisted mostly of precontact lithic artifacts and lesser quantities of historic cans and glass artifacts.

Esmeralda Solar Energy Center (BLM Report No: 6-3374)

From June 7 to June 14 and from June 18 to June 21, 2022, Dudek completed a Class III cultural resources inventory of approximately 8,809 acres for the Esmeralda Solar Energy project in Esmeralda County, Nevada (DeCarlo et al. 2023). The inventory resulted in the identification of 20 archaeological sites, including 6 previously documented sites and 14 newly discovered sites. The archaeological sites include 5 precontact sites and 15 historic sites. Precontact sites consist of lithic artifact scatters. Historic sites consist mostly of linear resources, such as historic dirt roads. Mining activities are also represented at 3 sites and in 10 isolated features. All sites have been recommended as not eligible for listing on the NRHP. In addition to the sites, 48 isolated finds and features were documented, including 10 isolated mining claims and 10 lithic SLR locations.

Smoky Valley Solar Project (BLM Report No: 6-3391)

From November 9 to 20, 2022; December 8 and 9, 2022; and February 21–24, 2023, SWCA completed a Class III cultural resources inventory of approximately 6,755 acres for the Smoky Valley Solar project in Big Smoky Valley in Esmeralda County, Nevada (Hoskins and Winslow 2023). The inventory resulted in the identification of 42 sites. The sites include 30 precontact sites, 10 historic sites, and 2 multicomponent sites. Precontact sites consist of lithic scatters; a few of these also contain features. Historic sites include roads, artifact scatters, and a railroad berm. Thirty-three sites have been recommended as not eligible for listing on the NRHP. Eight sites are recommended as eligible for listing on the NRHP. Seven of those sites are in the study area. In addition to the 42 sites, 40 isolated finds were documented, consisting of historic cans and bottles, flaked stone tools, single-reduction loci, and isolated debitage.

Nivloc Solar Project (BLM Report No: 6-3399)

On March 20, 2023, and April 10, 2023, Universal Engineering Sciences completed a Class III cultural resources baseline needs inventory of approximately 8,300 acres for the Nivloc Solar project in Big Smoky Valley in Esmeralda County, Nevada (Gorczyk and Simpson 2023). The inventory resulted in the identification of 6 previously recorded archaeological sites and 89 new sites or new segments of existing sites. The newly recorded resources include 1 cultural district, 69 precontact sites, 18 historic sites, and 1 multicomponent site. Precontact sites include mostly lithic scatters and thermally altered rock concentrations; most of these are found within the boundaries of the cultural district (D458). The historic sites are mostly refuse dumps, mine claims, and prospect pits.

The Blair Junction townsite (CrNv-54-2051/26ES585) is among the historic sites in the study area, as are segments of the Tonopah and Goldfield Railroad (CrNV-64-18841) and Silver Peak Railroad (CrNV-64-12902). The Silver Peak Railroad is considered eligible for listing on the NRHP, as is D458, the cultural district. Thirteen of the sites in D458 are considered to be contributing components. In addition to the archaeological sites, 131 isolated finds were documented, consisting mostly of precontact lithic artifacts and historic cans and bottle glass artifacts.

Red Ridge 1 Solar Project (BLM Report No: 6-3368)

From June 5 to July 27, 2022, and from March 27 to April 4, 2023, Stantec completed a Class III cultural resources inventory of approximately 6,711 acres for the Red Ridge 1 Solar project in Big Smoky Valley in Esmeralda County, Nevada (Solfisburg and Mahoney 2023a). The inventory resulted in the identification of 29 newly discovered archaeological sites. The sites include 24 precontact sites and 5 historic sites. Precontact sites consist mostly of lithic scatters of varying sizes and assemblage contents (some contain waste flakes only, while others have tool-production debris and discarded tools). Historic sites consist of historic road segments. Twenty-two sites have been recommended as not eligible for listing on the NRHP. Six sites are recommended as eligible for inclusion on the NRHP. One site, RR1-S-001, was identified as culturally important by tribal monitors and is treated as eligible for inclusion on the NRHP for the purposes of this study. In addition to the 29 sites, 82 isolated finds were documented, consisting mostly of precontact lithic artifacts, historic cans, and historic glass artifacts.

Red Ridge 2 Solar Project (BLM Report No: 6-3368)

From June 5 to July 27, 2022, and from March 27 to April 4, 2023, Stantec completed a Class III cultural resources inventory of approximately 7,057 acres for the Red Ridge 2 Solar project in Big Smoky Valley in Esmeralda County, Nevada (Solfisburg and Mahoney 2023b). The inventory resulted in the identification of seven newly discovered archaeological sites. Two previously recorded sites were identified during pre-field record searches, but they were not relocated during fieldwork. The seven newly discovered sites include two precontact sites and five historic sites. One of the precontact sites is a simple lithic scatter, while the other site, RR2-S-032, was identified as culturally important by tribal monitors.

Historic sites consist of four historic road segments and one historic temporary habitation site. Site RR2-S-032, identified as culturally important by tribal monitors, is treated as eligible for inclusion on the NRHP for the purposes of this study. The other sites are recommended as not eligible. In addition to the archaeological sites, 87 isolated finds were documented, consisting mostly of precontact lithic artifacts, historic cans, historic stoneware sherds, and glass artifacts.

Gold Dust Solar Project (BLM Report No: 6-3407)

From June 6 to September 21, 2023, and from January 9 to 18, 2024, ASM completed a Class III cultural resources inventory of approximately 17,006 acres for the Gold Dust Project in Big Smoky Valley in Esmeralda County, Nevada. The inventory resulted in the identification of 221 newly discovered archaeological sites. Fourteen previously recorded sites were identified during pre-field record searches. Of these, nine sites were relocated, three were not relocated, and two were recently recorded and not revisited. Of the nine previously recorded sites that were revisited and updated, one site, a newly documented segment of the historic Tonopah and Goldfield Railroad and associated features, is recommended eligible to the NRHP under Criteria A, C, and D.

Most of the newly recorded sites date to the precontact period and include small lithic reduction locations, primarily on the distal alluvial fans. Precontact camp sites containing abundant fire-affected rock, flaked stone artifacts, and ground stone are found in highly deflated inter-dunal areas, with intact thermal features also present on the dune flanks, indicating there is a substantial buried precontact component in the sand dunes. Historic sites include unassociated artifact scatters, roads, a segment of the Tonopah and Goldfield Railroad with associated features (26ES444), and the remains of the McLeans Railroad siding. Of the 221 newly recorded sites, 34 are recommended eligible for listing on the NRHP. Of these, 33 are precontact sites that contain features and/or concentrations of artifacts in a depositional environment, and one is a historic habitation site.

3.5 HYDROLOGIC RESOURCES

3.5.1 Hydrologic Setting

The planning area is in Esmeralda County, Nevada, between two prominent geomorphological features: the northwest-trending Sierra Nevada to the west and the north–south-trending Basin and Range Province to the east. Total relief in the basin is more than 9,000 feet, ranging from 13,145 feet above mean sea level at Boundary Peak in the White Mountains to approximately 3,700 feet, where Oriental Wash enters Death Valley at the California border (Farr West Engineering 2022). Elevations in the planning area range from about 4,700 to 5,500 feet.

Esmeralda County has an arid to semiarid climate. The upper mountain ranges have subhumid continental conditions with cold winters and moderate precipitation. The valleys and the rest of the region experience mid-latitude steppe and desert conditions with cold winters, hot summers, and semiarid to arid conditions. The lowest valley floors have a low-latitude desert climate with hot summers and arid conditions. The average maximum annual temperature at the Coaldale Junction climate station (about 3.5 miles west of the planning area) from 1941 to 1970[9] was 71.9 degrees Fahrenheit, and the average minimum annual temperature was 37.7 degrees Fahrenheit. The highest recorded temperature for the period of record was 110 degrees Fahrenheit in mid-July (WRCC 2023). The average maximum annual temperature at the Tonopah climate station (about 30 miles east of the planning area) from 1902 to 2016 was 61.9 degrees Fahrenheit, and the average minimum annual temperature was 40.4 degrees Fahrenheit. The highest recorded temperature for the period of record was 99 degrees Fahrenheit in mid-July (WRCC 2023).

[9] Monthly climate records for Coaldale Junction end in 1970.

Average annual precipitation at Coaldale Junction recorded between 1941 and 1970 was 3.35 inches. The monthly average ranged from 0.06 inches in June to 0.47 inches in May. Average annual snowfall was 7.7 inches, with measurable monthly snowfall occurring from October through March. The highest average monthly snowfall was 2.9 inches in January (WRCC 2023). The average annual precipitation at Tonopah recorded between 1902 and 2016 was 4.81 inches. The monthly average ranged from 0.21 inches in June to 0.62 inches in April. Average annual snowfall was 14.1 inches, with measurable monthly snowfall occurring from September through May. The highest average monthly snowfall was 2.6 inches in December (WRCC 2023).

Precipitation follows a bimodal distribution, with most rainfall occurring during winter or late summer. Winter storms last longer and produce more precipitation than short, scattered summer showers. Drought is common, with ongoing and varying drought conditions in most of the county. The average annual evaporation exceeds the average annual precipitation, with average evaporation ranging from 51 to 72 inches. As much as 95 percent of the total annual precipitation is lost through evaporation and transpiration, and less than 10 percent of the total annual precipitation recharges to groundwater. Groundwater is recharged primarily by runoff from seasonal snowpack rather than from rainfall (Farr West Engineering 2022).

The planning area is characterized by watersheds that drain to closed basins.[10] In Nevada, closed basins often contain terminal lakes and playas.[11] Most of the planning area is within the Big Smoky Valley watershed, which is divided into a northern part and a southern part. The southern part of Big Smoky Valley is referred to by Rush and Schroer (1971) as Tonopah Flat; it terminates in a playa lake called Big Smoky Playa (Walker and Motts 1969).[12] Portions of the project footprints (for example, the southeast corner of the Nivloc Solar footprint and the western end of the Smoky Valley Solar footprint) extend onto the playa surface. The elevation of the playa lake bed, which is the lowest part of the planning area, is at about 4,720 feet.

Groundwater quality in the Tonopah Flat area is generally poor, with total dissolved solids concentrations exceeding the federal drinking water regulation standards and ranging from about 300 to over 6,000 parts per million. The median of 15 samples from wells drilled in the Tonopah Flat area was reportedly about 850 parts per million (Rush and Schroer 1971).

[10] Closed basins are geographic areas where water flows into a basin or depression without an outlet to the ocean or any other external body of water. Instead of flowing out through rivers or streams, the water in closed basins may accumulate in a terminal lake, evaporate, or infiltrate into the ground, leading to the accumulation of salts and minerals over time.

[11] Playas are flat, dry lake beds that are typically found in desert regions. These playas are the remnants of ancient lakes or intermittent waterbodies that have dried up due to the arid climate and lack of an outlet. The playas in Nevada are characterized by their salt crusts and alkali flats. These areas often exhibit unique ecological conditions and may support specialized plant and animal species adapted to the harsh environment (NBMG 1964).

[12] Big Smoky Playa represents a remnant of a larger Pleistocene lake called Tonopah Lake (Meinzer 1917). The margins of Big Smoky Playa rise onto an alluvial apron formed by the coalescing alluvial fans at the base of the surrounding mountains. The slope of the alluvial apron increases from about 30 feet per mile near the playa to about 100 feet per mile at the upper margins of the planning area. At the northern end of the playa are sand dunes. The thickness of the alluvium beneath the playa is estimated to be 3,000 to 5,000 feet (Rush and Schroer 1971).

3.5.2 Surface Water

The planning area spans three hydrologic unit code (HUC) 12 watersheds: 160600030800 (Barrel Spring–Big Smoky Valley), 160600100509 (Frontal Columbus Salt Marsh), and 160600111305 (Angel Island–Clayton Valley; **Figure 3-2**, Watersheds, **Appendix A**). The planning area is mostly centered within the Barrel Spring–Big Smoky Valley watershed and consists of approximately 450 miles of ephemeral streams that drain to the playa from the surrounding slopes (**Figure 3-3**, Water Resources, **Appendix A**; USGS 2023; BLM GIS 2023). No springs or seeps have been mapped within the planning area (USGS 2023; Spring Stewardship Institute 2023). A relatively large, dry playa lake, the Big Smoky Playa, borders the northern boundary of the planning area.

Surface Water Quantity

Nearly all runoff into the Tonopah Flat area (an estimated 5,000 AFY) originates from the Toiyabe Range at the north end of Big Smoky Valley. Three large washes enter the valley north of Millers. The Ione Wash contributes about 300 AFY of surface water inflow from Ione and Peavine Creeks, and an unnamed wash contributes another approximately 2,800 AFY (Rush and Schroer 1971). Alluvial fans originating in the Monte Cristo Range contribute smaller amounts of runoff, with peak discharges ranging from 2 to 460 cubic feet per second, as measured at US Geological Survey stream gauge number 10249680.

The Big Smoky Playa becomes intermittently wet from occasional runoff and natural fluctuations of shallow groundwater beneath the playa; it may flood during periods of substantial rainfall. The playa lake partially filled in 2023 in response to subtropical precipitation. Anecdotal evidence suggests that the playa has been periodically flooded by runoff from the surrounding slopes. Walker and Motts (1969) noted that the playa was flooded for several weeks in the summer of 1965, when water covered about 75 percent of the playa to a depth of 6 to 18 inches. They noted that local residents reported that the playa floods once or twice during an average summer, and the water generally evaporates in days. Furthermore, tadpole shrimp and seed shrimp were documented in the playa following the subtropical rains in 2023. When watered and loaded with invertebrates during spring or fall migration, playas may contribute significantly to supporting waterfowl and shorebird migration.

Surface Water Quality

According to the NDEP's 2020–2022 Water Quality Integrated Report (NDEP 2022), there are no listed impaired waters. Preliminary assessments[13] have identified no waters of the United States (WOTUS) in the planning area (SWCA 2023; Stantec 2022h, 2022i). Given the recognized geographic isolation of the aquatic resources within the Big Smoky Valley and the subsequent lack of hydrologic connectivity to traditionally navigable waters, the drainage features within the planning area are likely not subject to federal jurisdiction by the US Army Corps of Engineers.[14]

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[13] Additional assessments are anticipated to be conducted on a site-specific basis for each project's site-specific engineering and design. See design feature WR1-2 in **Appendix B** for additional information.

[14] WOTUS in Nevada, per the current 2023 rule, include interstate and traditionally navigable waters (streams, lakes, and wetlands). Impoundments of a WOTUS, its tributaries, and adjacent wetlands may also be WOTUS if they are relatively permanent bodies of water or they significantly affect the chemical, physical, or biological integrity of the WOTUS (that is, the "significant nexus" standard). In Nevada, traditionally navigable or interstate waterways cover the Truckee, Carson, and Colorado Rivers; Lake Tahoe; and Pyramid and Walker Lakes. However, due to the geographic isolation of the water resources in Nevada, few drain into, or could be considered in "significant nexus" to, these waterbodies.

3.5.3 Groundwater

Most of the planning area is within the administrative boundary of the Big Smoky Valley/Tonopah Flat basin (Basin 137A; **Figure 3-4**, Groundwater Basins, **Appendix A**). Red Ridge 1 Solar extends into the Columbus Salt Marsh Valley basin (Basin 118). Red Ridge 2 Solar and Esmeralda Energy Center extend into the adjacent Clayton Valley basin (Basin 143). Statistics for the three basins within the area of analysis are summarized in the Hydrologic Resources Supplemental Environmental Report (BLM 2024f) and **Table 3-10**.

Table 3-10. Statistics for Hydrographic Basins

Hydrographic Basin	Big Smoky Valley	Clayton Valley	Columbus Salt Marsh Valley
Nevada Division of Water Resources (NDWR) hydrographic area number	137A	143	118
NDWR region	Central Region	Central Region	Central Region
Basin area (square miles)	1,599	557	381
Basin area (acres)	1,023,460	356,410	243,660
Basin area within the planning area (acres)	60,100	1,960	200
Regulatory status	Designated	Designated	Not designated
Estimated perennial groundwater yield (AFY)	6,000[15]	20,000	4,000
Percentage appropriated[16]	377%	118%	99%
Manner of use (committed AFY)	—	—	—
Domestic	23.63	0	0
Industrial	607.88	0	0
Irrigation	7,889.68	0	0
Mining, milling, and dewatering	13,728.78	23,100.23	3,953.78
Municipal	58.95	546.87	0
Quasi-municipal	31.22	41.79	31.86
Stockwater	200.54	38.13	2.36
Domestic well use[17]	114	2	8
Groundwater committed (AFY)[18]	22,654.68	23,729.02	3,996.00
Available for appropriation (AFY)[19]	0	0	4.00

Sources: NDWR 2024; BLM GIS 2023; Farr West Engineering 2022

Administrative boundaries of the groundwater basins do not necessarily represent sharp hydrologic divisions between basins. There are insufficient data from wells to accurately define the boundaries, and available data indicate interbasin flow across these boundaries.

At the regional scale, the planning area is in a regional groundwater flow system called the South-Central Marshes Regional Flow System (Mifflin 1968). The South-Central Marshes Regional Flow System covers

[15] Of the perennial yield of Basin 137A, 2,000 AFY have been assigned to Esmeralda County, and 4,000 AFY have been assigned to Nye County.
[16] Clayton Valley is 118 percent appropriated with pending applications that would increase appropriations to 182 percent, if approved.
[17] Domestic well use commitment is the number of active domestic wells in the NDWR database multiplied by 2 AFY (Nevada Revised Statutes 534.180). The amount of groundwater used by domestic wells is commonly approximated to be 1 AFY or less.
[18] Groundwater committed is the sum of all permitted, certificated, decreed, reserved, relinquished, revocable, and unadjudicated vested claims to groundwater rights, domestic well use commitment, and the groundwater reserve.
[19] NDWR's groundwater available for appropriation. It is estimated as the difference between the perennial yield and groundwater committed.

an area of about 6,790 square miles (Harrill and Prudic 1998) and includes 13 hydrographic basins that exhibit various degrees of interbasin flow. The planning area lies on the southwestern margin of this flow system, which locally includes the Big Smoky Valley/Tonopah Flat basin, the Ione Valley basin, the Columbus Salt Valley basin, the Fish Lake Valley basin, the Clayton Valley basin, the Alkali Valley basin, and the Ralston basin. Within this flow system, the general direction of groundwater flow is to the south-southwest, with groundwater at the south end moving in the general direction of the Death Valley sink (Mifflin 1968).

Groundwater Quantity

It has been estimated that about 12,000 AFY of groundwater recharge enters the Big Smoky Valley basin from precipitation and snowfall (Rush and Schroer 1971), and approximately 13,000 AFY flows out of the Big Smoky Valley basin into the Clayton Valley basin. Some groundwater may also discharge from Big Smoky Valley to Columbus Salt Marsh Valley. About 2,000 to 3,000 AFY is thought to flow from Ione Valley (Basin 135) into the north end of the Big Smoky Valley/Tonopah Flat basin (Lopes and Evetts 2005).

Recharge to the Big Smoky Valley/Tonopah Flat basin is mostly from precipitation at higher elevations in the northern portions of the Big Smoky Valley. Irrigation and mining in the northern portion of Big Smoky Valley, primarily in Nye County, are responsible for most of the groundwater withdrawals in the northern parts of the Big Smoky Valley basin, while lithium mining is the main cause of withdrawals in the Clayton Valley basin. In 2005, mining accounted for about 13,680 AFY of groundwater withdrawals from the Clayton Valley basin; this was roughly equal to the inflow from the Big Smoky Valley basin (Lopes and Evetts 2005). Mining activities have increased since then, and groundwater levels have reportedly been falling in the Clayton Valley basin.

Annual groundwater measurements by the Central Nevada Regional Water Authority in wells in the Big Smoky Valley/Tonopah Flat basin were relatively stable over the 12 years from 2010 to 2022, with relatively small declines observed (CNRWA 2022). For example, water levels in the Alum Well, located on the southeastern edge of the Smoky Valley Solar project area, decreased slightly from 58.38 feet below the ground surface (bgs) in 2010 to 58.56 feet bgs in 2022 (CNRWA 2022); this is a decline of 0.18 feet (about 2.2 inches).

Similar relatively small declines were observed in two other wells measured by the Central Nevada Regional Water Authority farther north. In the Rogers Stock Pond Well, located approximately 6 miles northeast of Millers and about 24 miles northwest of the Alum Well, water levels declined from 58.98 feet bgs in 2010 to 59.47 feet bgs in 2022, which is a decline of about 6 inches. At the Seyler Reservoir, located 25 miles northwest of the Rogers Stock Pond Well and near the northern boundary of the Big Smoky Valley/Tonopah Flat basin, water levels declined from 78.41 feet bgs in 2010 to 81.45 feet bgs in 2022, which is a decline of about 3 feet (CNRWA 2022).

The Clayton Valley hydrographic basin receives groundwater inflows from Big Smoky Valley and Alkali Springs Valley. It may receive minor groundwater inflows from the Fish Lake Valley and Lida Valley basins. Most of the hydrographic basin perimeter is made up of regions with an elevation of more than 7,000 feet, which helps to recharge the basin. The basin receives 1,500 AFY of recharge locally. However, due to groundwater withdrawals, the hydrographic basin of Clayton Valley is permanently losing storage.

The Columbus Salt Marsh Valley hydrographic basin is not designated; it receives recharge from Fish Lake Valley and possibly Big Smoky Valley (USGS and NDWR 1970). Adjacent Fish Lake Valley (Basin 117) is designated and extends into California. The planning area does not extend into the Fish Lake Valley basin; however, it is possible that groundwater is naturally discharged from groundwater flow to the Columbus Salt Marsh Valley and Clayton Valley hydrographic basins.

Both Big Smoky Valley and Clayton Valley are designated basins. Designated groundwater basins in Nevada are basins that are over-allocated. This means permitted groundwater rights approach or exceed the estimated average annual recharge, and water resources are being depleted, or they require additional administration. Nevada state law requires counties to prepare a water resources management plan if the basin is over-allocated. Esmeralda County updated its plan in 2022 (Farr West Engineering 2022). The state engineer determined that the perennial yield of Big Smoky Valley (Basin 137A) is 6,000 AFY. According to the Esmeralda County water plan, 2,000 AFY belongs to the county. The 2010 water use was 53 AFY. However, 8,000 AFY of water rights have been allocated in Esmeralda County.

Groundwater Quality

The general quality of the groundwater in Esmeralda County is suitable to marginally suitable, with limited exceptions, based on specific locations and proposed uses. The total dissolved solids concentration of groundwater in portions of Big Smoky Valley and Clayton Valley typically exceed federal secondary drinking water standards (500 milligrams per liter for total dissolved solids) due to the natural process of salt buildup by evaporation in areas of shallow groundwater (Handman and Kilroy 1997; Farr West Engineering 2022). Groundwater in the southern part of the basin is poor quality and does not meet drinking water standards due to elevated sulfate, chloride, and dissolved solids concentrations (Rush and Schroer 1971).

3.5.4 Floodplains

The Federal Emergency Management Agency (FEMA) has not completed a study to determine flood hazards for the planning area; therefore, the planning area contains no mapped FEMA flood zones (FEMA 2023), and the size of flood-prone areas and the probability of flooding in those areas have not been estimated. However, anecdotal evidence indicates that flooding regularly occurs on low-lying areas of the planning area (Walker and Motts 1969). Recent hydrologic assessments[20] anticipate potential floodplain impacts (Stantec 2022h, 2022i). As mentioned above in **Section 3.5.2**, Surface Water, the playa lake partially filled in 2023 in response to subtropical precipitation, and anecdotal evidence suggests that the playa has been periodically flooded by runoff from the surrounding slopes. See the Hydrologic Resources Supplemental Environmental Report (BLM 2024f) for more information.

Global warming is expected to increase the severity and frequency of extreme weather in the future, magnifying the risk of both drought and flooding. Floodplain impacts could be mitigated by avoiding regions with significant flood depths or through engineering design (Westwood 2022a, 2022b).

3.5.5 Wetlands and Riparian Zones

Based on the SWReGAP land cover data and the National Wetlands Inventory wetland data, there are approximately 1,570 acres of wetlands and riparian areas within the planning area (BLM GIS 2023). The

[20]Additional hydrologic assessments are anticipated to be conducted on a site-specific basis for each project's site-specific engineering and design. See design feature WR1-2 in **Appendix B** for additional information.

majority are identified as riverine, and they overlap approximately 440 miles (97 percent) of the ephemeral streams in the planning area (**Figure 3-5**, Wetlands and Riparian Areas, **Appendix A**). Wetland types are summarized in **Table 3-11**, below.

Although classified as riverine wetlands based on the interpretation of land cover and channel morphology, it seems unlikely that these ephemeral stream channels support sustained wetland conditions, much less riparian conditions, given the arid climate and soil types on the margins of the playa. Therefore, the acreage values in **Table 3-11** should be considered preliminary until confirmed by field studies. See the Hydrologic Resources Supplemental Environmental Report (BLM 2024f) for more information.

Table 3-11. Wetland Types in the Planning Area

Wetland Type	Cowardin Classifications[1]	Acres	Percentage of the Planning Area
Riverine	R4SBC, R4SBJ	1,510	2.4
Lake	L2USC	20	<1.0
Freshwater pond	PUSA, PUSJh	10	<1.0
Emergent marsh	—	30	<1.0
Total	—	**1,570**	2.5

Source: BLM GIS 2023; USFWS 2013; USACE 2016

[1] PUSA = palustrine, unconsolidated shore, temporarily flooded; PUSJh = palustrine, unconsolidated shore, intermittently flooded, diked/impounded; L2USC = lacustrine littoral, unconsolidated shore, seasonally flooded; R4SBC = riverine intermittent streambed, seasonally flooded; R4SBJ = riverine intermittent streambed, intermittently flooded

Note: The Gold Dust Solar and Nivloc Solar project areas contain small freshwater ponds. The Smoky Valley Solar and Nivloc Solar project areas overlap the playa boundary, classified as a lake. The Gold Dust Solar project area also contains about 30 acres of emergent marsh, identified by SWReGAP data.

3.6 Geology and Minerals

The planning area lies within the physiographic region of western North America known as the Basin and Range Province. The region encompasses more than 300,000 square miles stretching from Oregon and Idaho in the north southward through Nevada and Utah to eastern California, southern Arizona, and New Mexico. It is characterized by a repetitive pattern of alternating mountain ranges and intervening valleys that define a distinctive corrugated, or wrinkled, landscape. Much of the Basin and Range Province either lies in the rain shadow cast by the Sierra Nevada and the Cascades Range to the west or in latitudes that receive minimal rainfall, such that desert conditions prevail throughout most of it.

Within the Nevada portion of the Basin and Range Province, the ranges are typically less than 50 miles long and 10 to 25 miles wide; they rise a few thousand feet above the adjacent lowlands and are generally aligned to the north or northeast. The intervening valleys are generally much broader than the adjacent mountains, but with comparable lengths and a parallel north–south alignment. Many of the approximately 200 named valleys in Nevada are completely enclosed with no drainage into the adjacent valleys or river systems. Dry lake beds or playas are very common features of the intermountain basins in Nevada (DeCourten and Biggar 2017).

According to the Nevada Bureau of Mines and Geology's published Geological Terrane Map of Nevada, the most surface geology within the planning area consists of Quaternary-aged (less than approximately 2.6 million years old) playa, lake beds, and floodplain deposits (Crafford 2007, 2008). The southern portion of the planning area is described in more detail in the US Geological Survey's published surficial Geological

Map of the Rhyolite Ridge Quadrangle, Esmeralda County, Nevada (Robinson et al. 1976). The surficial deposits are described as Holocene-aged alluvial fan deposits and Pleistocene-aged older alluvium deposits. Robinson et al. describe the alluvial fan deposits as poorly sorted boulders, cobbles, grit, and minor sand and silts. Sediment particle sizes grade downslope into finer-grained valley fill, which includes stream deposits integrated with fan deposits. Older alluvium deposits include dissected alluvial fans containing poorly sorted deposits of boulders, cobbles, grit, sand, and silt. These rocks are the primary sedimentary rocks. The geologic units in the planning area are shown on **Figure 3-6** (Stewart and Carson 1978).

Miocene tuffaceous sedimentary rocks are exposed in the western portion of the planning area (Crafford 2010). These comprise thin-bedded, moderately sorted, fine-grained sandstone and siltstone, which are commonly tuffaceous, with glass-altered zeolites, some granular conglomerate, and several coal seams present at the north end of the Silver Peak Range (Robinson et al. 1976). These deposits are shown on **Figure 3-6** (**Appendix A**) as volcanic rocks.

3.6.1 Geological Hazards

The planning area is in a region that is characterized by active and potentially active faults and a relatively high level of historical seismicity characteristic of the Walker Lane. The Walker Lane is a diffuse zone of normal and strike-slip faults. It follows an approximately 60-mile-wide swath along the Eastern Sierra and California-Nevada border, reaching from Death Valley and the Garlock Fault in the south to north of the Honey Lake Valley region. The Walker Lane Fault system accommodates roughly 20 percent of the 2-inch-per-year, right-lateral shear between the Pacific and North American Plates, while the remaining 80 percent is accommodated along the more well-known San Andreas Fault system (Pierce 2021). A magnitude 6.5 earthquake was recorded in May 2020 in the Monte Cristo Range approximately 7 miles north of the planning area (USGS 2020). This type of event can cause strong to severe shaking and considerable damage in poorly or ordinarily designed buildings and structures.

3.6.2 Minerals (Fluid, Locatable, and Salable)

Economic minerals can be divided into three general types: fluid, locatable, and salable. Fluid minerals include oil and gas and geothermal resources. Rights to explore and extract fluid minerals are typically regulated through leasing of blocks of land from which wells can be drilled to access the underlying deposits. Locatable minerals generally include higher-value metallic or nonmetallic minerals found in ores. They are typically associated with mines, pits, and tunnels, and with facilities to process and extract the target minerals from the ores. Salable minerals are lower-value minerals such as sand, gravel, dimension stone, and other materials that can be quarried or excavated.

Fluid Minerals

Although there has been historical oil and gas exploration in the planning area, none of the exploratory wells drilled were completed. There are no active oil and gas leases in the planning area and no production has been reported. The last well drilled less than 1 mile from the planning area was drilled in 2010 and was abandoned (NDOM 2023). The Nevada Bureau of Mines and Geology has indicated that the entire planning area has very low to no potential for oil and gas production (Garside and Hess 2011).

Geothermal leases overlap the planning area and the proposed segregation area (see **Figure 3-7**, **Appendix A**). One observation well drilled in 2010 is in the segregation area and is shut in (NDOM 2023). Observation wells are used to monitor the temperature and fluid levels of the groundwater.

Locatable Minerals

There are several active mining claims for locatable minerals in the planning area; these are primarily in the southeastern portion of the planning area (see **Figures 3-8** and **3-9**, **Appendix A**). These include both placer and hard-rock claims. Within the alluvial basin areas of the planning area, most active placer and hard-rock claims appear to be associated with lithium-containing clays and brines. There are currently no active projects to extract lithium or other locatable minerals in the planning area. Note that **Figures 3-8** and **3-9** display public land survey system sections with existing claims within the section, but individual claims are smaller than a section. Claim boundaries within a section are recorded in a format that cannot be easily converted to display on a map to indicate sections with at least one claim within the section; the entire section is not necessarily under existing claims. To avoid unintentionally locating solar project infrastructure and other ROWs on patented mining claims and valid unpatented mining, the BLM cadastral survey would be enacted to coordinate necessary location processes prior to commencement of any ground-disturbing activity.

Solid Leasable Minerals

The BLM has received one application for a potassium prospecting permit that may overlap a portion of the planning area.

Salable Minerals

There are several permits for salable mineral (mineral materials) sites in the planning area issued to the Nevada Department of Transportation. The materials from these sites are used primarily for road construction and maintenance.

3.7 LANDS, REALTY, AND CADASTRAL SURVEY

Lands and realty is assessed by analyzing current land activities, landownership, and land use designations in adopted plans and policies. A land use assessment must also consider legal guarantees or limitations, such as those provided by easements, deeds, ROWs, claims, leases, licenses, and permits. Federally managed lands are not zoned, but they may be encumbered by easements, ROWs, mining claims, or permits. Special designation areas provide additional protection for areas with unique natural, historic, scenic, or recreational resources; these are addressed under Cultural Resources (**Section 3.4**), Recreation (**Section 3.13**), Land with Wilderness Characteristics (**Section 3.8**), and Visual Resources (**Section 3.17**).

The planning area encompasses approximately 62,300 acres of public lands in Esmeralda County, Nevada, approximately 30 miles west of Tonopah, Nevada. Esmeralda County ranks as the highest in terms of the percentage of federal landownership or administration relative to all other Nevada counties. Since over 97 percent of the county is under federal management and approximately 50 percent of the private land consists of patented mining claims, little opportunity exists for community expansion on private land. Of the county's 2,284,800 acres of surface area, the BLM manages 2,247,863 acres (94.3 percent).

3.7.1 Land Use Plans

Federal land uses in the planning area are governed by various land use plans. These plans typically establish goals, objectives, and standards that apply to the land and resources managed. To ensure the best balance of uses and resource protections for public lands, federal agencies undertake extensive land use planning through a collaborative approach with local, state, and tribal governments; the public; and stakeholder groups. The documents provide land use planning and management direction on a broad scale and guide future actions on federal land. Land use plans are the basis for every on-the-ground action the agencies undertake. As required by NEPA and FLPMA, BLM-administered lands that are not designated for special management must be managed under the principles of multiple use and sustained yield.

3.7.2 BLM Field Office and Applicable RMP

The Tonopah Field Office is the primary field office responsible for the development of the planning area. The following RMPs and RODs apply to the Tonopah Field Office planning area:

- 1994 Tonopah Proposed Resource Management Plan/Final Environmental Impact Statement[21] (BLM 1994)
- 1997 Approved Tonopah Resource Management Plan and Record of Decision[22] (BLM 1997)

Some of the previous land use plan amendments to the Tonopah RMP, in particular the Solar RMPA (BLM 2012), which address solar development on BLM-administered lands in the western US, including Nevada, would also be applicable to activities within the planning area.

3.7.3 Federal

The BLM is the primary agency responsible for administering land use in the planning area, with a majority of lands falling under the BLMs jurisdiction, accompanied by a few private parcels (**Figure 1-1**, **Appendix A**).

3.7.4 County Plans

The Esmeralda County Master Plan[23] is the only county plan that is applicable to the planning area. The county plan contains limited guidance on energy or transmission other than assisting potential energy and transmission development (Esmeralda County 2011).

3.7.5 Local

The largest town near the planning area is Tonopah, Nevada. Tonopah does not have a municipal-specific plan; rather, the town follows the Nye County Master Plan.[24] The Nye County Master Plan is not relevant to the planning area because the planning area is wholly located in Esmeralda County.

3.7.6 Land Use

Land use authorizations on BLM-administered surface land include ROW grants, permits, leases, and easements under several different authorities, including Section 302 of FLPMA; the Recreation and Public Purposes Act of 1926, as amended (43 USC 869); and the Mineral Leasing Act of 1920, as amended (30 USC 185). Renewals and requests for new ROWs are the primary demand for the BLM lands and realty and cadastral survey program in the planning area.

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[21] eplanning.blm.gov/public_projects/lup/77957/104361/127930/1994_Tonopah_RMP_&_FEIS_-_PROPOSED.pdf
[22] eplanning.blm.gov/public_projects/lup/77957/104362/127931/1997_Tonopah_RMP_and_Record_of_Decision_-_APPROVED.pdf
[23] https://cms2.revize.com/revize/esmeraldanew/document_center/Es__Co___Master_Plan_adopted_Dec__7__2011.pdf
[24] https://nyecountynv.gov/DocumentCenter/View/42028/Nye-County-2011-Comprehensive--Master-Plan-June-7-2011-pdf

The four primary municipalities or towns in proximity to the planning area are Tonopah, Goldfield, Hawthorne, and Silver Peak. While the municipalities and towns are not in the planning area, they would play a pivotal economic role and are included in the assessment area for social values, economic conditions, and EJ (**Section 3.14**).

Tonopah is the closest town to the planning area with services. In 2022, the town of Tonopah had a population of approximately 1,777 and 1,342 housing units (US Census Bureau 2022a). Tonopah is relatively compact (9.3 square miles) and supports the surrounding area with a healthcare facility, public parks, public library, police and fire services, and primary and secondary schools.

Goldfield is an unincorporated area in Esmeralda County; it is approximately 20 miles southeast of the planning area. In 2022, Goldfield had a population of approximately 212 and 207 housing units (US Census Bureau 2022a). Goldfield is compact, with limited services and few infrastructure-related facilities.

Hawthorne is the largest community in proximity to the planning area. In 2022, Hawthorne had a population of approximately 2,739 and 1,120 housing units (US Census Bureau 2022b). Hawthorne is compact (1.8 square miles) and supports the surrounding area with a small healthcare facility, public parks, a public library, police and fire services, and primary and secondary schools.

Silver Peak is a small community in proximity to the planning area. In 2022, Silver Peak had a population of approximately 213 (US Census Bureau 2022a).

Since the lands and realty assessment area is mostly rural, there are very few land use categories within the planning area. Most land use falls under the agricultural and multiple-use BLM-administered lands categories. **Table 3-12** displays some of the existing land use categories that are present or not present in the planning area. Land use in the land use assessment area includes transportation and other ROWs (see full description below).

The primary existing land covers in the planning area are barren and shrub/scrub. General developed land use types were determined using land use classifications from the US Geological Survey National Land Cover Database. Grazing allotments cover approximately 49,210 acres (79 percent) of the planning area. Additional information on grazing in the analysis area is provided in **Section 3.12**, Rangeland – Grazing Management.

Table 3-12. Land Use Categories in and Adjacent to the Planning Area

Land Use Category	Land Use Category Definition and Summary
Residential	Low-, medium-, and high-density single-family residential, multifamily residential (for example, apartment complex), rural residential, and mobile home parks. The communities of Tonopah, Goldfield, Hawthorne, and Silver Peak include low-density, single-family, and rural residential.
Commercial	Restaurants, gas stations, banks, grocery stores, motels and hotels, and other retail businesses. Commercial use occurs in Tonopah, Hawthorne, and Goldfield along US Highway 95.
Industrial	Warehouse businesses, manufacturing companies, storage facilities, and other uses. The Albermarle lithium processing facility in Silver Peak is a substantial industrial facility within the assessment area. The planning area overlaps some mining claims and material sites.

Land Use Category	Land Use Category Definition and Summary
Agriculture	Ranching, livestock grazing, farming, and dairy operations. Agricultural land uses within the lands and realty assessment area are primarily ranching and livestock grazing.
Utilities/Energy Infrastructure	Power plants, substations, transmission lines, pipelines, canals, designated utility corridors, and solar farms. Utility and energy ROWs occur within the planning area.
Communication Facilities	Cellular, radio, cable, and telephone facilities. A variety of communication infrastructure is scattered throughout the lands and realty assessment area; there is a telephone ROW within the planning area.
Transportation	Minor roads (county highways and city streets), major roads (interstates and state highways), railroads, and trails. The major roads within and adjacent to the planning area are SR 265 and Highways 95 and 6.

Source: BLM GIS 2023

3.7.7 Rights-of-Way

The BLM ROW program is the most active portion of the lands and realty program in terms of the number of cases processed. Per 43 CFR 2801.1, the BLM's objective is to grant ROWs and temporary use permits to any qualified individual, business entity, or governmental entity and to regulate, control, and direct the use of ROWs on BLM-administered land to accomplish the following:

- Protect the natural resources on both BLM-administered surface lands and adjacent properties, whether private or administered by another government agency.
- Prevent unnecessary or undue environmental damage to the lands and resources.
- Promote the utilization of ROWs in accordance with engineering and technological compatibility, national security, and current land use plans.
- Protect, perpetuate, and renew (a) the Public Land Survey System (PLSS) and mineral survey markers and (b) update and keep current the land status records system, surface management agency, and PLSS Dataset.
- Coordinate, to the fullest extent possible, all ROW actions with state and local governments, interested individuals, and appropriate quasi-public entities.

ROW exclusion areas are designated zones where ROWs should not be permitted. ROW avoidance areas are designated zones where new ROWs would be allowed but should ideally be located elsewhere. Exceptions may be considered in these designations if analysis shows that placing ROWs in other locations is not feasible or would result in greater impact. The proposed facilities would not be within any ROW avoidance or exclusion areas. The nearest ROW avoidance area is a seasonal avoidance area near Emigrant Peak, approximately 3 miles east of the proposed Red Ridge 1 project area boundary (BLM 1997, p. 19). There are 640 acres of lands identified as suitable for disposal in the northern sections of the planning area. Existing ROWs in the planning area are displayed in **Figure 3-10**, Existing Right-of-Ways and Land Suitable for Disposal, **Appendix A**.

The proposed solar facilities are adjacent to the proposed corridor for NV Energy's Greenlink West 525 kV transmission project. Other BLM-authorized ROWs in the planning area are listed in **Table 3-13**. Approximately 48.6 percent of the existing ROWs consist of roads, with transmission lines accounting for 20.4 percent; telephone lines represent 10.0 percent. Transmission lines, telephone lines, roads, and pipelines are primarily concentrated in the upper northwest portion of the planning area (**Figure 3-10**, **Appendix A**). Additionally, there is a notable presence of roads extending toward the western side of the planning area (**Figure 3-10**, **Appendix A**).

Table 3-13. BLM-Authorized Rights-of-Way

Feature	Extent of Occurrence within the Planning Area
Material sites	8 miles
Roads	47 miles
Telephone/telegraph lines	19 miles
Transmission line	20 miles
Withdrawal class reserves	3 miles
Corral	1 feature
Reservoir	1 feature
windmill	1 feature

Source: BLM GIS 2023

3.8 LANDS WITH WILDERNESS CHARACTERISTICS

Section 201 of FLPMA requires the BLM to maintain an inventory of all public lands and their resources and other values, which include wilderness characteristics. Lands with wilderness characteristics are generally roadless BLM-administered lands greater than 5,000 acres (or less if they meet size exception criteria, such as being adjacent to a designated wilderness area or a wilderness study area) that have maintained their natural character and are primarily undeveloped. Additionally, they provide outstanding opportunities for solitude or for primitive and unconfined recreation, and they may possess supplemental values, including those that are ecological, geological, or other features of scientific, educational, scenic, or historical value. Under FLPMA Section 201, and later per guidance outlined in BLM Manual 6310 (BLM 2021a), the BLM has been conducting an updated inventory for lands with wilderness characteristics on BLM-administered lands in the Battle Mountain District and anticipates finalizing this updated inventory during the Nevada Resource Management Plan Modernization Project.

BLM Manual 6320 (BLM 2021b) allows the BLM discretion to manage lands with wilderness characteristics that may result in a variety of outcomes, including, but not limited to, the following:

- Allowing for other multiple uses in an area while not protecting wilderness characteristics
- Minimizing impacts on wilderness characteristics via management restrictions (such as terms and conditions of use or stipulations) while emphasizing other multiple uses
- Protecting wilderness characteristics while providing for compatible multiple uses

The BLM may choose any one of these outcomes, or some combination thereof, for a parcel of land possessing wilderness characteristics, provided the land use plan documents the basis for this determination.

3.8.1 Current Conditions

Approximately 46,340 acres have been inventoried for wilderness characteristics in the planning area, and 2,260 acres were determined to meet the criteria to be identified as possessing lands with wilderness characteristics (see **Table 3-14** and **Figure 3-11**, **Appendix A**).

Table 3-14. Lands with Wilderness Characteristics

Unit Name	Total Inventoried Acres in the Planning Area	Acres that Meet Lands with Wilderness Characteristics Criteria
NV-050-03RIV	4,530	0
NV-050-03RJE	1,970	0
NV-050-03RQD	170	0
NV-050-312	3,400	0
NV-050-312A	3,610	0
NV-050-316A	310	0
NV-050-322	15,230	0
NV-050-322A	2,540	0
NV-050-328B	6,870	0
NV-050-329	5,420	0
NV-050-330A	30	0
NV-050-3111	520	520
NV-050-312H	1,250	1,250
NV-050-323	490	490
Total	**46,340**	**2,260**

Source: BLM GIS 2023

The lands with wilderness characteristics units in **Table 3-14** have not been evaluated through a land use planning effort; therefore, the BLM has not determined whether these units will be managed to protect their wilderness characteristics.

3.9 NATIVE AMERICAN CONCERNS

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, and Executive Order 13007.

3.9.1 Federally Recognized Tribes

The project site falls within the tribal traditional use area that can be attributed to the Northern Paiute, Owens Valley Paiute, and Western Shoshone (Sturtevant 1986). The federally recognized tribes that were contacted and provided an opportunity to comment or consult regarding this PEIS/RMPA are listed under **Section 4.3**, Formal Consultation with Tribal Governments. Government-to-government consultation is ongoing with the Big Pine Paiute Tribe of the Owens Valley, Bishop Paiute Tribe, Duckwater Shoshone Tribe, Shoshone-Paiute Tribes, Duck Valley Indian Reservation, Timbisha Shoshone Tribe, Utu Utu Gwaitu Paiute Tribe, and Yomba Shoshone Tribe.

3.9.2 The Western Shoshone, Northern Paiute, and Owens Valley Paiute

Territorial Boundaries

Western Shoshone territory encompassed approximately one-third of what would become the state of Nevada. Thomas et al. (1986) state that "Western Shoshone country extended from the arid reaches of Death Valley inhabited by the [Timbisha] Shoshone, through the mountainous highlands of central Nevada into northwestern Utah, where it encompassed the area of the Goshute of Tooele and Skull Valleys and Deep Creek and the 'Weber Ute.' The northern boundary is rather arbitrarily taken as roughly the divide separating the Humboldt River drainage from the Snake and Salmon River area, where the Northern Shoshone lived; the people of the Duck Valley Reservation are also included."

Northern Paiute territory extends from southeastern Oregon into Idaho and south down into Nevada. The arbitrary boundaries discussed by Fowler and Liljeblad (1986) state that the western portion of the territory runs along the Sierra Nevada; the northern portion is beyond the summits that create the drainage systems for the Columbia and Snake Rivers. The eastern boundary extends from Mono Lake to the crest of the Desatoya Range. The southern boundary is also Mono Lake, which is also inhabited by the Owens Valley Paiute.

The Owens Valley Paiute occupy the valley on the eastern escarpment of the Sierra Nevada, with a territory ranging from south of Owens Lake (where their territory overlaps that of the Timbisha Shoshone) to the north of Benton and Mammoth Lakes (where their territory overlaps that of the Kutzadika'a, a Northern Paiute group; Fowler and Liljeblad 1986).

3.9.3 Overview of Culturally Important Resources

The Northern Paiute, Western Shoshone, and Owens Valley Paiute have used the planning area for thousands of years; the region is of great cultural significance, as they believe these lands were given to them by their Creator. The planning area contains numerous cultural features that contribute to the history and the long-term use of this region by tribes. Tribes 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.

3.9.4 Water Resources

The scarcity and unpredictability of water in this semiarid region may account for the importance of water in the Great Basin religion. According to Miller (1983), water "is the keystone of Great Basin religion because power, with its affinity for life, was strongly attracted to water." The Western Shoshone have indicated that power is believed to be present in prominent peaks in the ranges that collect most of the precipitation that falls in the Great Basin, and they have expressed the belief that Mount Tenabo is such a peak.

3.9.5 Geological Features

Prominent geological features in the planning area include the surrounding mountain ranges, including the Sierra Nevada and the White Mountains, the Silver Peak Range, Weepah Hills, Lone Mountain, and the Monte Cristo Range.

3.9.6 Wildlife and Botanical Resources

Large game was much scarcer than vegetal resources in the central Great Basin (Steward 1937, p. 628; 1938, p. 33). As during the Middle Archaic, bighorn sheep remained the most important big game animal exploited in the region. Ranked second to the bighorn was antelope. Rabbits also played an important part in the subsistence economy of the Western Shoshone. Groups would often come together for rabbit drives where large groups of people would herd rabbits together and dispatch them with clubs. In addition to being used for food, rabbits were also an important source of fur for blankets and clothing.

Steward (1938, p. 110) provides accounts of contact with the Native population in the Belmont area, where after the pine nut harvest, a 5-day fall festival was held in Big Smoky Valley by Captain John at Hot Creek, Millet's Ranch, Manhattan, or elsewhere. During historic times, Belmont became a center for both white and Native populations and was the location where many festivals and rabbit drives took place under the direction of a tribal elder (referenced as Old Joe). An individual named Brigham was chief of some 25 people in Big Smoky Valley during the early days of Belmont.

The Western Shoshone used digging sticks to obtain root-type foods and seed beaters to knock loose grass seeds into fan-shaped basket trays. A long hook pole was used to pull pine cones down from piñon pines; seeds were boiled or toasted on parching tray-shaped baskets and ground into flour using a metate and mano. Pine nut caches were placed within walking distance of winter camps to guarantee food provisions during the winter months. Chokecherries, wild currants, and blackberries were also collected in the fall and eaten fresh, dried and made into puddings, or shaped into cakes made from the pulp of the fruit (Inter-Tribal Council of Nevada 1976).

Rodents were hunted year-round with traps, dug out of their burrows with skewers, or smoked or flooded out. Communal hunts of bighorn sheep and antelope were a significant social event for the Western Shoshone. During the hunts, antelopes were driven into V-shaped runways that led to a corral constructed of poles, stones, and brush, where the animals would be dispatched by archers. Although rabbits were hunted throughout the year, large drives took place in the fall as another communal event. Much of the meat was dried for winter storage, and the hides were used for clothing and blankets (Steward 1970; Thomas et al. 1986).

Few ceremony types have been documented for the Western Shoshone. The only documented traditional dance common to all Western Shoshone groups is the Circle or Round Dance. The Round Dance was included in most festivals, which were held during pine nuts festivals, rabbit drives, and pronghorn hunts (Thomas et al. 1986). One of the primary places for such festivals was Battle Mountain. Another central concept in Great Basin religions is the belief that supernatural power (*Puha*) has permeated the earth since the Indigenous Great Basin people were created and brought to their homeland, the age "when animals were people" (Miller 1983).

3.9.7 Native American Concerns Identified through Consultation

Under Section 106 of the NHPA, Native American consultation and coordination have not identified any historic properties or sacred sites. Three potential traditional cultural properties[25] (TCPs) have been

[25] Properties of traditional religious and cultural importance (NHPA, Section 101(d)(6)(A) and (B); 36 CFR 800.2(c)(2)(ii) and 21), also referred to as TCPs, are geographic places prominent in a particular group's cultural practices, beliefs, or values.

identified in the planning area, although consultation is ongoing; these TCPs are D458, RR1-S-001, and RR2-S-032.

Tribal monitors assisted with three of the seven projects. From April 3 to April 10, 2023, a member from the Duckwater Shoshone Tribe accompanied the Nivloc field crew as a tribal monitor. The Duckwater Shoshone tribal monitor consulted on the identification of precontact resources and features of greatest concern within the landscape (D458). D458 is a cultural district in the southern portion of the Big Smoky Valley in Esmeralda County along the southern edge of Pleistocene Lake Tonopah. D458 consists of 45 archaeological resources ranging from complex sites with multiple hearth features, various ground stone, and lithic reduction flakes to simple flake scatters. The presence of occasional tools, including diagnostic projectile points, and organic material for radiocarbon dating give the cultural district important potential to yield information critical to the chronological resolution of tool types. An Elko corner notched point and a Gatecliff series stemmed point found at two sites within the landscape suggest that for at least these two resources, occupation was sometime during the last 5,000 years, although the projectile point typologies come from Thomas (1986) and may have less granular chronological resolution outside the Monitor Valley.

The nature of the site types—which are characterized mostly by hearth features and occasionally subsistence-related tools such as manos and metates—suggests seasonal occupation over long periods at a time when above-surface water was still present in the lake and the landform on which the sites are situated was a promontory or an island. Further chronological resolution for the resources contained within the landscape could come from radiometric dating on samples of organic materials (for example, charcoal) contained in several hearth features within the landscape. The artifact typologies and assemblages appear to represent Western Shoshone burial practices. There are purposefully broken artifacts within D458, and the assemblages match known burial sites from around the state.

During the surveys of the Red Ridge 1 Solar and Red Ridge 2 Solar proposed project areas, two rotating tribal monitors were present over the course of the surveys. Five consulting tribes provided tribal monitors over the course of the inventory; these were the Timbisha Shoshone, Yomba Shoshone, Duckwater Shoshone, Duck Valley Shoshone-Paiute, and Big Pine Paiute. The Duckwater Shoshone and Timbisha Shoshone tribal monitors consulted on the identification of precontact resources and features of greatest concern within the landscape (RR1-S-001 and RR2-S-032).

The RR1-S-001 site dimensions use a default centroid point with a 98-foot diameter site boundary. The area is situated on an alluvial fan in the southernmost quadrant of the Big Smoky Valley. The RR2-S-032 site dimensions use a default centroid point with a 98-foot diameter site boundary. The area is situated on an alluvial fan in the southernmost quadrant of the Big Smoky Valley. Both RR1-S-001 and RR2-S-032 do not have detailed descriptions of the site provided in the Class III inventory reports; they are pending BLM consultation with consulting tribes.

3.10 Noise

The acoustic environment, or soundscape, is the combination of all sounds in a given area. These include natural sounds, such as wind, water, and sounds caused by insects, birds, and other wildlife. These also include human-caused sounds, which are considered noise because they have the potential to affect the natural acoustic environment and the noise-sensitive resources in that environment.

The decibel (dB) is the accepted unit of measurement for noise. Human response to noise is extremely diverse and varies according to the type of noise source, the sensitivity and expectations of the receptor, the time of day, and the distance between the noise source and the receptor. The sensitivity of the human ear to sounds of different frequencies is measured by the A-weighted decibel (dBA) scale. The smallest change in noise level that a human ear can perceive is about 3 dBA; increases of 5 dBA or more are clearly noticeable, and a 10 dBA change in noise levels is judged by most people as a doubling of sound level. **Table 3-15** describes the noise levels of some familiar sources and human responses to these noise levels to give context to how solar energy development may be perceived by human receptors. The effects of noise on wildlife are discussed in **Section 3.2**, Biological Resources.

As noted in **Table 3-15**, sound levels of 80 to 90 dBA typically elicit annoyance. Annoyance describes a reaction to sound, based on its physical nature and its emotional effect. Though subjective, annoyance is routinely used as a basis for evaluating environmental noise impacts. The level of annoyance is affected by the sound's persistence and frequency, the magnitude of its fluctuation (whether it is impulsive versus steady), and whether the receiver finds the sound to be pleasant or unpleasant. In general, annoyance increases with the persistence of the sound, its impulsivity, more frequent and greater fluctuations, and a receptor's perceived inability to exert control over the noise source (Kroesen et al. 2008; Stallen 1999).

Table 3-15. Typical Noise Levels and the Associated Human Perception or Response

Noise Source	Noise Level (dBA)	Human Perception or Response
Air-raid siren	140	Painfully loud
Thunderclap	130	Painfully loud
Jet takeoff (200 feet)	120	Maximum vocal effort
Pile driver; rock concert	110	Extremely loud
Firecrackers	100	Very loud
Heavy truck (50 feet)	90	Very annoying
Hair dryer	80	Annoying
Noisy restaurant; freeway traffic	70	Telephone use difficult
Conversation	60	Intrusive
Light automobile traffic (100 feet)	50	Quiet
Living room; bedroom	40	Quiet
Library; whisper (15 feet)	30	Very quiet
Broadcasting studio	20	Extremely quiet

Source: Olivera et al. 2011

The propagation of sound in outdoor settings is affected by many variables, including the distance from the source; meteorological conditions, such as temperature, wind, and humidity; and landscape features and surface characteristics that may interfere with sound through absorption, reflection, or diffraction (Attenborough 2014). Among these, distance is the most significant factor. For a point source producing a constant sound, sound levels are expressed as dB and generally decrease by approximately 6 dB for each doubling of distance from the source. The same 6 dB reduction with the doubling of distance holds for the maximum sound level produced by a single moving source, such as an aircraft in flight, when the source is at its closest point of approach to the receptor (Attenborough 2014). For a line of moving sources, such as vehicle traffic on a road, sound levels decrease by approximately 3 dB with the doubling of distance.

When wind is present, sound diminishes with distance less than expected in the downwind direction—downwind propagation is enhanced—and greater than expected in the upwind direction. Temperature inversions decrease and enhance propagation. In general, meteorological conditions tend to enhance sound levels to a lesser degree, such as 1 to 5 dB, than decrease sound levels, such as 5 to 20 dB (Attenborough 2014).

3.10.1 Existing Conditions

The study area for noise includes a 10-mile radius around the planning area, which includes the seven proposed solar and battery storage facilities; the local and regional road network that would be used to deliver equipment, materials, and workers to the planning area; and cumulative sources of noise in the region.

The planning area is within a rural, sparsely populated and generally undeveloped area. The existing ambient noise environment is mainly made up of natural sounds; vehicle noise associated with area roadways, US Highways 6 and 95, SR 265, Emigrant Pass Road, Nivloc Road, and 60.4 miles of unnamed public road; and aircraft overflights, including those from the Tonopah airport. Uses of BLM-administered lands are a source of human-caused noise in the planning area, including off-highway vehicle (OHV) use, livestock grazing operations, and travel route access and maintenance. While no ambient noise measurements have been collected for the planning area, noise from BLM studies in other rural areas are assumed to be representative of conditions in the planning area. For instance, the BLM Winnemucca District estimated that the average ambient noise levels in rural Washoe County were 63 dBA, with primary noise sources being traffic on nearby state- and county-designated routes, overflying aircraft, wind, and wild horses.[26]

Other sources of noise in the region could include private lands operations, maintenance, and use; noise from commercial, agricultural, or industrial areas; and industrial noise from sand and gravel operations, and mining and geothermal activities (see **Sections 3.6**, **3.12**, **3.13**, and **3.16** for additional information on minerals, livestock grazing, recreation, and travel management, respectively, in the planning area).

Sensitive noise receptors are generally considered to be homes, hospitals, schools, libraries, parks, and recreational areas. No sensitive noise receptors have been identified in or adjacent to the planning area; the nearest sensitive area identified is the Silver Peak Elementary School, which is approximately 15 miles south of the planning area boundary. Rural residences may be present along some area roadways that would be used to move equipment, materials, and workers to the planning area.

3.11 Paleontological Resources

Paleontological resources are fossilized remains, traces, or imprints of organisms preserved in the earth's crust that are of paleontological interest and that provide information about the history of life on earth (Paleontological Resources Preservation Act of 2009, Section 6301; 16 USC 470aaa). Generally, vertebrate fossils are considered significant resources with high scientific value, though some invertebrate and plant fossils may also be considered significant resources with high scientific value.

[26] The BLM Winnemucca District analyzed noise effects from proposed construction in rural Washoe County at a site that is assumed to be similar, in terms of ambient noise, to the planning area. The average ambient noise level was found to be 63 dBA, and primary noise sources were from traffic on nearby state- and county-designated routes, overflying aircraft, wind, and wild horses. More information can be found at the following internet website: https://eplanning.blm.gov/eplanning-ui/project/2016744/510.

The BLM manages fossils to promote their use in research, education, and recreation in accordance with the Paleontological Resources Preservation Act, Subtitle D of the Omnibus Public Land Management Act of 2009, recent Department of the Interior rulemaking (43 CFR 49:1-810), BLM Permanent Instructional Memorandum 2022-009 (BLM 2022b), and the general guidance of FLPMA and NEPA. The Paleontological Resources Preservation Act directs federal land managers to manage and protect fossils using scientific principles and expertise. The Paleontological Resources Preservation Act does not make a distinction between the types of organisms preserved; therefore, all plant, invertebrate, and vertebrate fossils are to be actively managed. FLPMA and NEPA do not mention paleontological resources specifically, but they mandate the consideration of natural resources, which include paleontological values. BLM Permanent Instructional Memorandum 2022-009 details guidance for implementing the Paleontological Resources Protection Act; explains the Potential Fossil Yield Classification (PFYC) system, which is the BLM's paleontological classification system; and provides guidelines for assessing potential impacts on paleontological resources to determine mitigation steps for federal actions on BLM-administered lands.

The PFYC system is a way of classifying geological units based on the relative abundance of vertebrate or scientifically significant fossils (plants, vertebrates, and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates a higher potential for presence, while a PFYC ranking of "U" indicates these geological units cannot receive an informed PFYC ranking. The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geological unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class. Instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating impacts on paleontological resources. The classification should be considered at an intermediate point in the analysis, and it should be used to assist in determining the need for further mitigation assessment or actions. The BLM intends for the PFYC system to be used as a guideline rather than as a rigorous definition.

3.11.1 Current Conditions and Trends

The planning area is within the Basin and Range physiographic province of North America. This province is characterized by north- or northwest-trending mountain ranges bounded by faults against adjacent basins. The distinctive pattern of alternating linear mountain ranges and valleys created by faults is the product of crustal extension that thinned and cracked the earth's crust as it was pulled apart. This geological setting provides ample opportunity for surface exposure and the study of paleontological resources.

A multitude of valuable and unique resources are found in geological formations throughout southwest Nevada, including in and around the planning area. The lands administered by the BLM Tonopah Field Office, within which the planning area is located, include the first reported localities for many species of plant, invertebrate, and vertebrate fossils. In some cases, these species have yet to be discovered anywhere else on earth (Henshaw 1940; BLM 1994). Geological formations that contain significant resources and are known to be exposed near the planning area include the Esmeralda Formation, the Siebert Formation, the Luning Formation, the Poleta Formation, and the Emigrant Formation. These formations host a variety of significant plant, invertebrate, and vertebrate fossils (Albers and Stewart 1965; BLM 1994; BLM GIS 2023).

While no significant paleontological localities are known within the planning area, the planning area contains known surface exposures of the Esmeralda Formation (Albers and Stewart 1965; BLM GIS 2023). It also contains Quaternary alluvium deposits and a variety of other sedimentary geological units in which fossils might be encountered (Crafford 2007, 2008, 2010).

Exposed or shallowly buried paleontological resources are constantly subject to natural processes, such as erosion. Surface exposure can lead to discovery of paleontological resources, but exposed fossils can be damaged and lost through subsequent erosion or collection. As with natural processes, paleontological resources are regularly subject to collection, authorized or otherwise.

The PFYC rankings of the acreage in the planning area are presented in **Table 3-16** and shown in **Figure 3-12**, **Appendix A**. Approximately 94.1 percent of the planning area is classified as PFYC 2 (58,650 acres); most of these acres consist of recent Quaternary alluvium at the surface.

Table 3-16. PFYC in the Planning Area

PFYC Values	Total Acreage	Percentage of the Planning Area
1-Very low	230	.4
2-Low	58,650	94.1
3-Moderate	0	0
4-High	1,230	2.0
5-Very high	0	0
U - Unknown	2,170	3.5
Total	62,280	100

Source: BLM GIS 2023

3.12 Rangeland – Grazing Management

The BLM administers public land grazing in accordance with the Taylor Grazing Act of 1934, FLPMA, and the 1978 Public Rangelands Improvement Act. Grazing use on BLM-administered land is administered through grazing authorizations issued by field offices to qualified applicants. Allotments are areas of land designated and managed for multiple use, including livestock grazing, where forage is allocated and permitted by the BLM for livestock use. The amount and length of use are described in the terms and conditions of the grazing authorization, which is usually a permit or lease, normally issued and renewed on a basis of 10 years.

Grazing use is permitted and authorized based on animal unit months (AUMs). An AUM is equal to the amount of forage necessary for the sustenance of one cow/calf pair, one horse, or five goat or sheep, or the equivalent for a period of 1 month. More prescriptive management and flexibility may be used to achieve resource and operational goals and objectives through allotment management plans or other functional equivalents. When grazing permits and leases expire, they may be renewed based on continued availability of the grazing area, grazing preference, land health assessments, and satisfactory record of performance.

Three grazing allotments overlap the planning area: Monte Cristo, Sheep Mountain, and Silver Peak (see **Table 3-17**). Combined, these three allotments cover 49,210 acres (79 percent) of the planning area. All permitted AUMs are in use on the Monte Cristo and Sheep Mountain allotments (9,352 AUMs and 1,740 AUMS, respectively). Approximately 52 percent (1,635) of the AUMs on the Silver Peak allotment are temporarily suspended;[27] 1,530 AUMs remain active.

Table 3-17. Allotments in the Planning Area

Allotment	Permitted Use	Active AUMs	Suspended AUMs	Total Acres	Acres within the Planning Area	Percentage of the Planning Area
Monte Cristo	9,352	9,352	0	496,020	13,090	21%
Sheep Mountain	1,740	1,740	0	88,440	3,110	5%
Silver Peak	3,165	1,530	1,635	281,490	33,020	53%
Total	**14,257**	**12,622**	**1,635**	**865,950**	**49,220**	**79%**

Source: BLM GIS 2023

3.13 Recreation

The area of analysis for recreation includes the planning area, which consists of 62,300 acres of BLM-administered lands comprising the seven separate proposed solar and energy storage system projects. The planning area is 30 miles west of Tonopah and 170 miles north of Las Vegas in the southern end of the Big Smoky Valley. It is surrounded by mountain ranges with elevations ranging between 4,700 and 5,500 feet.

There are no existing developed recreational opportunities in the planning area. There also are no special recreation management areas or extensive recreation management areas within or close to the planning area boundary. Approximately 46,340 acres have been inventoried for wilderness characteristics in the planning area, and approximately 2,260 acres were determined to meet the criteria to be identified as possessing lands with wilderness characteristics (BLM GIS 2023). Land with wilderness characteristics can provide outstanding opportunities for solitude or for primitive and unconfined recreation (see **Section 3.8**, Lands with Wilderness Characteristics).

Three designated recreation areas are within 50 miles of the planning area: the Sump Extensive Recreation Management Area, Clayton Valley Sand Dunes Special Recreation Management Area, and Crescent Sand Dunes Special Recreation Management Area. There are additional identified sites with recreational value within 50 miles of the planning area, including rock-climbing destinations and a wild burro viewing area, as well as four designated wildernesses and 11 wilderness study areas; however, none are within the planning area (BLM GIS 2023).

US Highway 95 and Nevada SR 265 bisect the planning area. Additionally, there are numerous motorized routes (99 miles) within the planning area that may facilitate backcountry recreation access (BLM GIS 2023). Most traffic in the area occurs on US Highway 95 and Nevada SR 265 (see **Section 3.16**, Transportation, Access, and Public Safety). The landscape is not clear of human impacts, as there are

[27] "Suspended" means the withholding from active use, through a decision issued by the BLM Authorized Officer or by agreement, of part or all of the grazing preference specified in a grazing permit or lease (43 CFR 4100.0-5).

numerous historic and existing mining operations located in or near the planning area (see **Section 3.6**, Geology and Minerals).

The recreational setting is remote, and recreational use in the planning area's general location is limited. Dispersed recreation that occurs in the planning area includes, but is not limited to, hunting, camping, hiking, prospecting, rock collecting, looking for cultural artifacts, and OHV use. The NDOW issues hunting tags for use within game management units 211, 212, and 213; portions of these overlap the planning area (see **Figure 3-13**, Game Management Units, **Appendix A**). Tags issued for big game species in these game management units include pronghorn, bighorn sheep, and mule deer (NDOW 2022). Most hunting activity for bighorn sheep and mule deer occurs in the mountain ranges surrounding the planning area, including the Silver Peak Range and Lone Mountain, where big game species are more often found (NDOW 2023a, 2023b). Pronghorn are typically in valleys, but they are more abundant in those outside the planning area and the Big Smoky Valley generally (NDOW 2023c).

There are also special recreation permits (SRPs) issued for activities that overlap the planning area, including competitive OHV events. The primary event is the popular Casey Folks Vegas to Reno Race, which began in 1996 and takes place every summer. As of 2022, the route covers nearly 500 miles over the course of a single day between the towns of Beatty and Dayton, Nevada. The types of OHVs that participate in this event include motorcycles, utility-terrain vehicles, trucks, and off-road racing cars (methodracewheels.com 2022). There were 218 participants in 2022, and the event brings in both in-person spectators and is streamed online (bitd.com 2022). The route used for the race varies by year, but historically it has passed through the planning area. **Figure 3-14**, Vegas to Reno Race Route, and **Figure 3-15**, Recreation Opportunities, **Appendix A**, identify areas of overlap between the 2023 Casey Folks Vegas to Reno Race and the planning area, which includes the proposed development.

3.14 Social Values, Economic Conditions, and Environmental Justice

To provide a comprehensive understanding of the social and economic setting within the six-county socioeconomic study area (SSA), the following narrative presents a summary of the economic and demographic data at the county level. Additional details may be found in the Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report (BLM 2024g).

Population is an important measure that provides valuable information on the impact of economic changes in a community, such as boom-and-bust cycles in employment or a regional economic downturn. Over the recent 10-year period from 2010 to 2020, the population in the six counties that comprise the SSA experienced a 9.5 percent increase overall (see **Table 3-18**, Population Characteristics in the SSA (2010 to 2040)). This rate of growth was higher than that of California and lower than Nevada's rate. Population growth has been unequally distributed throughout the SSA, however, with Lyon and Nye Counties in Nevada experiencing the most rapid growth (of 12.2 and 14.8 percent, respectively) due primarily to proportionally high domestic in-migration (US Census 2022a). Inyo County, California, had a growth of only 2.4 percent during this period, while Mono County, California, had a negative population change of -7.6 percent. Esmeralda and Mineral Counties in Nevada also had a negative population change of -7.4 and -4.8 percent, respectively. The lower growth seen in Inyo County and the population loss in Mono, Esmeralda (the planning area's location), and Mineral Counties are due primarily to proportionally high domestic out-migration (US Census 2022a).

Table 3-18. Population Characteristics in the SSA (2010 to 2040)

Geography	2010	2020	2010–2020 Percent Change	Projected Population in 2030	Projected Population in 2040	Projected 2020–2040 Percent Change
California	**37,253,956**	**39,538,223**	**5.7**	**41,860,549**	**43,353,414**	**8.8**
Inyo County	18,546	19,016	2.4	18,020	17,552	-8.3
Mono County	14,202	13,195	-7.6	14,118	14,009	5.8
Nevada	**2,700,551**	**3,104,614**	**13.0**	**3,525,793**	**3,785,099**	**18.0**
Esmeralda County	783	729	-7.4	967	885	17.6
Lyon County	51,980	59,235	12.2	63,723	69,687	15.0
Mineral County	4,772	4,554	-4.8	5,197	5,820	21.8
Nye County[1]	43,946	51,591	14.8	56,078	67,656	23.7
Socioeconomic Study Area	**134,229**	**148,320**	**9.5**	**158,103**	**175,609**	**15.5**

Sources: US Census 2010a, 2020; CDOF 2021; NDT 2021

[1] Note: The Pahrump census county division accounts for a large percentage (87 percent) of the total county population.

Population projections prepared for the states of Nevada and California show projected growth over the next 17 years, resulting in an estimated population of 175,609 by 2040 in the SSA (NDT 2021; CDOF 2021). Overall, net migration is anticipated to result in an estimated population increase of 15.5 percent from 2020 levels in the SSA. For comparison, over the same period, population growth of 8.8 percent is expected in California and 18.0 percent is anticipated in Nevada.

The SSA is predominately white, non-Hispanic (69.7 percent overall, which is over 20 percent higher than in California or Nevada statewide). The non-white percentage of the population ranges from 27.2 to 41.3 percent in SSA counties (see **Table 3-19**, below).

Table 3-19. Race and Ethnicity Characteristics (2017–2021)

Geography	Percent White Alone, Non-Hispanic	Percent Non-white	Percent Hispanic or Latino	Percent Native American	Percent Black or African American	Percent Asian
California	**35.8**	**64.2**	**39.5**	**0.3**	**5.4**	**14.7**
Inyo County	59.8	40.2	23.7	9.3	0.4	1.5
Mono County	64.1	35.9	27.3	0.8	0.0	4.6
Nevada	**47.2**	**52.8**	**29.3**	**0.8**	**8.9**	**8.2**
Esmeralda County	68.6	31.4	28.0	0.4	1.1	0.0
Lyon County	72.8	27.2	18.4	2.0	1.0	1.2
Mineral County	58.7	41.3	15.2	18.6	3.1	1.3
Nye County	72.3	27.7	15.7	1.2	1.9	1.8
Socioeconomic Study Area	**69.7**	**30.3**	**18.9**	**3.1**	**1.2**	**1.8**

Source: US Census 2021a

3.14.1 Community Indicators

Demographics

Social characteristics and attitudes within the planning area are affected by the surrounding demographic and economic trends. For example, changes in regional industry sectors or a local population influx can change the predominant lifestyles and attitudes of the local residents. The median age and educational attainment of local residents are factors often tied to other socioeconomic indicators, such as employment and income levels.

BLM management actions bear a relationship to these indicators. For example, potential mineral development and the construction timing of solar complexes and energy transmission lines can affect the housing supply and labor demand, which can consequently affect local and regional socioeconomic conditions. A detailed discussion of indicators reflecting existing socioeconomic conditions is provided below. Data for community indicators are presented here as reported in US Census Bureau American Community Survey 5-year estimates for rural counties.

The median age of the population in the SSA during the 2017–2021 time frame ranged from 40.3 (in Mono County) to 55.8 (in Esmeralda County), while the median age in California and Nevada was 37.0 and 38.3, respectively (US Census 2021c, 2021d). Compared with 5-year estimates from 2006 to 2010, counties experiencing the highest change in median age included Lyon, Mineral, Mono, and Nye, Counties. In Mineral County, the median age decreased from 50.6 to 44.8. In Lyon, Mono, and Nye Counties, the median age increased from 39.6, 36.5, and 47.4 to 43.6, 40.3, and 52.9, respectively (US Census 2010b, 2021c).

In terms of educational attainment, the population in the SSA during the 2017–2021 time frame had a lower level of people who had bachelor's degrees or higher (17.4 percent), as compared with Nevada or California as a whole (26.1 and 35.3 percent, respectively).

Housing

Economic development or population growth can affect housing availability and costs. **Table 3-20** displays housing occupancy information in the planning area for the 2017–2021 time frame. Approximately 21.2 percent of housing in the SSA was vacant, as compared with the California and Nevada averages of 7.8 and 10.1 percent, respectively. Rental availability ranged from 0.4 percent in Esmeralda County to 4.7 percent in Mono County.

The number of occupants per room is a measure of the degree to which group housing occurs in SSA counties. Group housing accounted for less than 1 percent of the total housing reported in the SSA. The percentage of owner-occupied dwellings with two or more occupants per room in the SSA was similar to the percentage in Nevada overall (both were 0.2 percent) and lower than California's overall percentage (0.3 percent). For the percentage of owner-occupied dwellings with two or more occupants per room, Nye County, Nevada, was an outlier within the SSA with a percentage (0.4 percent) twice that of the SSA and Nevada overall. The percentage of renter-occupied dwellings with two or more occupants per room was lower in the SSA compared with both California and Nevada (0.0 percent, 1.5 percent, and 0.4 percent, respectively).

Table 3-20. Housing Tenure and Occupancy Characteristics, 2017–2021 (Based on 5-Year Estimates)

Geography	Total Housing Units	Percent						Two or More Occupants per Room of Owner-Occupied Housing (Percent)	Two or More Occupants per Room of Renter-Occupied Housing (Percent)
		Occupied	Vacant	For Rent	For Seasonal, Recreational, or Occasional Use	For Migrant Workers[1]	Other Vacant		
California	**14,328,539**	**92.2**	**7.8**	**1.7**	**2.6**	**0.0**	**2.2**	**0.3**	**1.5**
Inyo County	9,457	82.8	17.2	1.1	8.2	0.0	7.2	0.0	0.0
Mono County	13,616	39.4	60.4	4.7	51.3	0.0	2.0	0.0	0.0
Nevada	**1,269,846**	**89.9**	**10.1**	**2.8**	**3.1**	**0.0**	**2.6**	**0.2**	**0.4**
Esmeralda County	768	63.0	37.0	0.4	11.2	0.4	23.6	0.0	0.0
Lyon County	24,120	92.6	7.4	1.2	1.0	0.0	3.8	0.2	0.0
Mineral County	2,367	73.4	26.6	1.9	2.8	0.0	20.0	0.0	0.0
Nye County	24,793	86.4	13.6	0.9	6.5	0.2	4.7	0.4	0.0
Socioeconomic Study Area	**75,121**	**78.0**	**21.2**	**1.7**	**13.0**	**0.1**	**4.0**	**0.2**	**0.0**

Sources: US Census 2021c, 2021d, 2021e

[1] A migrant worker is defined as an individual who is required to be absent from a permanent place of residence in another country for the purpose of seeking remunerated employment in the United States. Migrant workers may include seasonal farmworkers employed in temporary agricultural work who may also have other sources of employment.

Estimates of the existing supply of workforce accommodations were ascertained from a survey conducted in June 2023 of local accommodations in the communities immediately surrounding the proposed projects.[28] Results from this survey of local overnight hotel and short-term rental establishments indicate that, while occupancy rates fluctuate in the area depending on the season, there is vacancy to accommodate a transient workforce of roughly 739 people per day at local hotels and recreational vehicle resorts in Dyer, Goldfield, Hawthorne, and Tonopah.

The cost of housing can be influenced by other factors within local and regional economies, such as mineral development-related fluctuations in housing availability. In this way, housing costs, including rents, are determined by demand. Project-related developments can reduce the amount of available housing and thereby drive rental prices upward, making it more difficult for local residents to afford housing. Moreover, these increased housing costs can disproportionately affect populations of EJ concern. Housing costs for owner-occupied housing in 2021 (based on 5-year estimates) for every county in the SSA were below average compared with costs in either California or Nevada (see **Table 3-21**, Housing Costs, 2017–2021 (Based on 5-Year Estimates)). Monthly costs accounting for 30 percent or more of household income were less prevalent in the SSA (33.2 percent) than they were in California (37.5 percent); however, they were more common than in Nevada (29.9 percent).

Table 3-21. Housing Costs, 2017–2021 (Based on 5-Year Estimates)

Geography	Owner-Occupied Housing Units	Median Monthly Mortgage Cost	Monthly Cost >30% of Household Income (Percentage of Total)	Renter-Occupied Units	Gross Rent >30% of Household Income (Percentage of Total)
California	**5,075,316**	**$2,548**	**37.5**	**5,882,339**	**51.5**
Inyo County	2,221	$2,050	34.8	2,789	32.0
Mono County	2,396	$2,107	42.3	1,836	28.3
Nevada	**445,071**	**$1,655**	**29.9**	**482,281**	**48.5**
Esmeralda County	34	$900	38.2	251	45.4
Lyon County	11,184	$1,492	30.4	5,350	42.0
Mineral County	540	$1,126	24.3	456	29.4
Nye County	8,228	$1,332	34.4	5,870	38.1
Socioeconomic Study Area	**24,603**	**N/A**	**33.2**	**16,552**	**37.1**

Sources: US Census 2021c, 2021d

Employment and Income

Compared with California, population, employment, and total personal income have increased more rapidly in the SSA. Compared with Nevada, population and employment have increased more slowly in the SSA, while total personal income has increased at roughly the same pace. Notably, employment and personal income growth in the SSA (20.4 percent and 85.6 percent) also outpaced population growth between 2000 and 2020 (9.5 percent). Within the SSA, per capita personal income in 2021 was highest in Mono County ($69,297) and lowest in Nye County ($46,219; BEA 2022e, 2022i). Unemployment in the

[28] The towns of Dyer, Goldfield, Hawthorne, and Tonopah were selected based on a 90-minute drive time from the planning area. Tonopah contained the majority of establishments offering accommodations (57 percent), as well as the greatest overall availability (55 percent). The availability of accommodations in Dyer, Goldfield, and Hawthorne was 10 percent, 5 percent, and 29 percent, respectively.

SSA generally followed state-level trends, decreasing since 2013 with a spike in 2020, falling again in 2021. Within the SSA, all counties had 2021 unemployment rates lower than their respective state averages, with the highest rate of unemployment in Inyo and Mono Counties, California, and Nye County, Nevada (6.0, 6.8, and 5.9 percent, respectively). Within the SSA, Esmeralda and Mineral Counties in Nevada had the lowest unemployment in 2021 (3.6 percent and 3.7 percent, respectively).

When examined by industry, key economic sectors can be identified. In 2021, the two nongovernment industry sectors with the highest percentage of total employment within the SSA were accommodation and food services (12.9 percent) and retail trade (11.2 percent). The industries with the next largest share of total employment in the SSA included construction (6.2 percent) and professional and technical services (6.1 percent). From 2010 to 2021, the four industry sectors with the highest percentage change in employment were transportation and warehousing (42.9 percent), mining (29.8 percent), utilities (29.3 percent), and construction (29.0 percent).

Income is composed of labor earnings, which are wages paid to employed workers, and nonlabor income, which includes investment income and entitlements such as Medicaid, Medicare, social security, unemployment, and welfare programs. In 2021, labor earnings were the largest source of income for the SSA, California overall, and Nevada overall. In the SSA, the growth in total personal income (of 85.6 percent over the 21-year period from 2000 to 2021) was in step with that of Nevada overall (86.4 percent), and it outpaced California overall (68.3 percent).

Social Services

Access to basic amenities in rural communities in Nevada is limited. One important indicator for access to basic services is the amount of health professional shortage area (HPSA) designations within a given geographic area. The Health Resources and Services Administration, an agency of the US Department of Health and Human Services, funds primary care offices in every US state and territory. The Health Resources and Services Administration Division of Policy and Shortage Designation supports primary care offices in the designated HPSAs and medically underserved areas or populations. These designations leverage federal resources to help states improve access to primary care, dental care, and mental health care.

The main criterion for designation is the ratio of population to provider for a defined geographic area. Depending on the type of designation, other criteria include poverty rates, infant health measures, travel time to access care, fluoridation of public water, population age, and substance abuse rates. HPSA scores are developed for use by the National Health Service Corps to determine priorities for the assignment of clinicians. Scores range from 1 to 25 for primary care and mental health. The higher the score, the greater the priority. All 17 counties in Nevada have some type of shortage designation due to very high ratios of population to provider. Southern Nye County is listed as having a HPSA score of 16, which is the highest in the SSA (NDPBH 2023). In rural and frontier areas, travel time to access a provider can be several hours, which is also a significant factor in shortage designation.

Environmental Justice Communities

EJ refers to the fair treatment and meaningful involvement of people of all races, cultures, and incomes with respect to the development, implementation, and enforcement of environmental laws, regulations, programs, and policies (CEQ 1997). Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to determine whether proposed actions would have disproportionately high and adverse environmental impacts on minority, low-income, and Native American populations.

The BLM incorporates EJ efforts into the planning process by identifying potential areas where minority populations, low-income communities, and tribes may be disproportionately and adversely affected by impacts from the proposed action(s). The BLM also incorporates EJ efforts in documenting findings and recommended solutions (BLM 2022a). For example, increased burdens on the community to provide services could impact public services for minority populations. Additionally, communities of EJ concern can be collocated with areas of high development activity. In September 2022, the BLM published IM 2022-059 (BLM 2022b) to update the best practices recommended for completion of EJ analyses. The BLM recognizes that the diversity of communities, projects, and processes requires the flexibility to adopt multiple approaches or select more sensitive or context-specific approaches.

The Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report (BLM 2024g) contains a detailed discussion of the identification of populations for EJ considerations in the planning area.

3.15 Soils

Soils are formed from the interactions between parent materials, climate, organisms, and topography over time. The physical, chemical, and biological properties of soils differ with changes in soil characteristics (such as texture, structure, and porosity). These properties alter the ecosystem services, including storing and cycling nutrients, purifying the air and water, storing and regulating water flow, and providing support for plants and human structures. These properties contribute to the soil quality, which is the capacity of a specific soil to function physically, chemically, and biologically within managed or natural ecosystem boundaries (Weil and Brady 2019).

Soil map units provide interpretations of soils for physical, chemical, and biological properties and land suitability characteristics. Soil map units generally consist of one or more major soil series. A soil series consists of those soils that have similar horizons from the surface down, developed from related parent materials, under common climate and similar vegetation. **Table 3-22** lists the soil map units that occur in the planning area; these units are from Version 18 of the Esmeralda County Area, Nevada soil survey (NRCS 2023a, 2023b). Most of the soils have high gravel and calcium carbonate contents, have a sandy or loamy texture, and are formed in mixed alluvium materials derived from volcanic rocks.

Soil orders are a general classification of soil types with differing characteristics. Of the 12 soil orders defined by the US Department of Agriculture, the planning area has two: Aridisols and Entisols. **Table 3-22** shows the soil orders that are attributed to each soil map unit in the planning area.

Aridisols are characteristically dry soils. The Aridisols in the planning area (25,340 acres) have accumulations of clay, hardened layers of cemented silica, or both, in the subsoil.[29] Entisols are the youngest of any soil order. The Entisols in the planning area (35,390 acres) have the same (aridic) soil moisture regime as the Aridisols. These soils are composed of recently deposited alluvial sediments, so they are typically shallow and minimally weathered, with little to no clay accumulation in the subsoil.

[29] Soil that is beneath the land surface

Table 3-22. Soil Map Units

Map Unit Symbol	Map Unit Name	Soil Order	Acres	Percentage of the Planning Area
100	Unsel-Belted-Orphant association	Aridisols	1,020	1.6
101	Unsel-Wardenot-Izo association	Aridisols	9,860	15.8
103	Unsel-Silverbow-Izo association	Aridisols	210	0.3
106	Unsel-Wardenot-Terlco association	Aridisols	1,380	2.2
110	Blacktop-Rock outcrop-Pintwater association	Entisols	100	0.2
151	Kawich-Playas association	Entisols	2,030	3.3
162	Yomba-Playas-Youngston association, alkali	Aridisols	400	0.6
194	Terlco-Roic-Wardenot association	Entisols	1,820	2.9
310	Gynelle-Oricto association	Entisols	19,170	30.8
311	Gynelle-Cirac association	Entisols	2,530	4.1
312	Gynelle-Gynelle-Orcito association	Entisols	660	1.1
317	Gynelle-Oricto association, warm	Entisols	20	Less than 0.1
340	Zaba very gravelly loam, 0 to 8 percent slopes	Aridisols	650	1.0
341	Zaba-Gynelle association	Aridisols	620	1.0
350	Roic-Oricto-Wardenot association	Entisols	540	0.9
352	Roic-Wardenot-Badland association	Entisols	890	1.4
360	Downeyville-Pintwater-Rock outcrop association	Entisols	160	0.3
370	Rustigate-Louderback-Cirac association	Entisols	80	0.1
380	Nuyobe-Rustigate-Playas association	Entisols	20	Less than 0.1
442	Wardenot-Izo association	Entisols	370	0.6
443	Wardenot-Roic association	Entisols	2,080	3.3
454	Cirac-Playas-Kawich association	Entisols	3,290	5.3
455	Cirac-Kawich association	Entisols	1,480	2.4
470	Ardivey-Unsel-Wardenot association	Aridisols	11,210	18.0
480	Stonell-Wardenot-Izo association, moist	Entisols	160	0.3
900	Playas	—	1,530	2.5
—	**Total**	**—**	**62,280**	**100**

Sources: BLM GIS 2023; NRCS 2023b

3.15.1 Slope

To ensure the solar collectors can utilize the resource most effectively, flat ground is the most suitable for solar-generating technologies (BLM 2012). **Table 3-23** and **Figure 3-16**, Percent Slope, **Appendix A**, show the percent slopes, at 5 percent intervals, in the planning area. The slopes were calculated with GIS using a digital elevation model. Most soils in the planning area (approximately 61,970 acres) are on slopes less than or equal to 5 percent. The remaining approximately 320 acres are on slopes greater than 5 percent. According to the 2012 Solar RMPA, which amended the Tonopah RMP, lands with slopes greater than 5 percent, as determined through GIS analysis using digital elevation models, are excluded for individual solar development applications (BLM 2012).

Table 3-23. Percent Slope Intervals

Percent Slope Interval	Acres	Percentage of the Planning Area
0%–5%	61,970	99.5
6%–10%	270	0.4

Percent Slope Interval	Acres	Percentage of the Planning Area
11%–15%	40	Less than 0.1
16%–20%	10	Less than 0.1
Total	**62,280**	**100**

Source: BLM GIS 2023

3.15.2 Erosion Potential

Wind and water erode soil when soil aggregate stability is reduced. Soil erosion is influenced by many factors, such as wind, precipitation, and soil moisture and structure. Soils can be naturally susceptible to erosion because of such factors as slope, vegetation type and density, ground cover, wind, and soil moisture properties. The slope influences the lateral movement of water in soil, which can result in runoff and soil erosion. In general, runoff generation and soil erosion typically increase as the slope percentage increases; however, as described above, most soils are on flat areas (slopes less than or equal to 5 percent) in the planning area.

Plant roots, organic matter, and biological soil crust provide resistance to erosion at the soil surface (Pellant et al. 2020). Soil aggregate stability decreases when compactional forces reduce infiltration to the point that surface runoff increases, which increases the potential for water erosion (Pellant et al. 2020). Soils that lack vegetation cover are more susceptible to erosion and runoff (Zobeck and Van Pelt 2014; Wei et al. 2023). This is because plants increase soil aggregate stability at their roots to reduce wind erosion and intercept water at the soil surface to reduce water velocity and runoff.

Wind erodibility groups (WEGs) are groupings of soils with similar properties affecting their resistance to soil blowing. WEGs are rated from 1 to 8. Soils in WEGs 1 and 2 are considered highly susceptible to wind erosion because of their fine, sandy texture and dryness. Approximately 27,700 acres (44.6 percent) of soils in the planning area are rated as WEG 1 and 2 (see **Table 3-24**). These correspond to soil map units 151, 162, 310, 311, 312, 317, and 443 (see **Table 3-22**). Conversely, soils in WEG 8 are not susceptible to wind erosion because of their high rock content, wetness, or both. These do not occur in the planning area. Most of the remaining soils in the planning area (approximately 26,640 acres) are in WEG 6 (see **Table 3-24**) and are less susceptible to wind erosion.

Table 3-24. Wind Erosion Susceptibility (WEGs)

WEG	Acres	Percentage of the Planning Area
1	2,430	3.9
2	25,340	40.7
3	5,140	8.3
4	0	0
4L[1]	100	Less than 1
5	2,610	4.2
6	26,640	42.8
7	0	0
8	0	0
Total	**62,260**	**100**

Source: BLM GIS 2023
[1]This rating is specifically for loams with calcium carbonate.

Water erosion is the detachment of soil particles by water; it can occur as sheet or rill erosion. Sheet erosion occurs when a uniform layer of soil is removed, usually due to rainfall (Weil and Brady 2019). Rill erosion occurs when detached particles are transported by running water that results in channel flow; slope is a contributing factor (Weil and Brady 2019).

These types of water erosion can be quantified with an index called Kw factor, which is a relative index of susceptibility of bare soil to particle detachment and transport by rainfall (Soil Science Division Staff 2017). Its values range from 0.02 for the least erodible soils to 0.64 for the most erodible. Soil properties that affect the Kw factor include texture (clay, silt, and sand content), organic matter content, structure (the arrangement of soil aggregates and the pore spaces between them), and the rate of water movement through the soil. Soils high in clay content have low Kw values (between 0.02 and 0.20) because they are not susceptible to detachment. Sandy soils also have low Kw values because of large pore spaces in their structure, which provide water drainage and low runoff potential. Silty loams are medium-textured soils that have moderate Kw values (between 0.21 and 0.40) because they are moderately susceptible to detachment and runoff. Soils with high silt content have high Kw values (greater than 0.40) and are the most erodible; this is because they are easily detached, and they produce high rates of runoff (Michigan State University 2002; USDA 2016).

As shown in **Table 3-25**, most soils (approximately 72.7 percent) in the planning area are within the low Kw value range and would have low runoff potential. Soils with moderate and high Kw values in the planning area have playa associations or are adjacent to soils with playa associations. These correspond with the following soil map units: 110, 151, 162, 194, 311, 350, 352, 360, 362, 370, 380, 443, 454, 481, and 900 (see **Table 3-22**). Soil map unit 380 is the only map unit with a high Kw factor (greater than 0.40).

Table 3-25. Water Erosion Susceptibility (Kw Factor)

Kw Factor Value	Acres	Percentage of the Planning Area
0.02–0.20	45,310	72.7
0.21–0.40	16,930	27.2
0.41–0.64	20	Less than 0.1
Total	**62,260**	**100**

Source: BLM GIS 2023

3.15.3 Biological and Physical Soil Crusts

Biological soil crusts are an intimate association between soil particles and cyanobacteria, algae, micro fungi, lichens, and bryophytes (in different proportions); these live within or atop the uppermost millimeters of soil. They are found in all dryland regions of the world and in all vegetation types within these lands. In these landscapes, biological soil crusts often cover all soil spaces not occupied by trees, grasses, or shrubs, and can comprise over 70 percent of the living ground cover (Rosentreter et al. 2007). Biological soil crusts have not been inventoried in the planning area, but they have the potential to occur.

The microscopic biocrust communities function ecologically to stabilize soils, fix nitrogen and carbon, regulate water cycling in and out of soils, capture dust, accumulate organic matter, supply nutrients to vascular plants, enhance or reduce seedling establishment, promote chemical and physical weathering, provide wildlife habitat, and regulate soil food web interactions (Rosentreter et al. 2007; Warren et al. 2021).

Physical soil crusts may also occur in the planning area. These are thin layers on the soil surface that are structurally different from the material immediately beneath them. In contrast to biological soil crusts, physical crusts reduce soil porosity and water infiltration (Belnap et al. 2001; Pellant et al. 2020). They are formed when rainfall hits the soil surface and breaks up soil aggregates, allowing smaller particles to wash in. Upon drying, the soil components glue together and form a crust that is often harder than the underlying material because it contains evaporated salts and minerals. Soils with higher silt content are more vulnerable to crusting, as are soils with low organic matter content and high sodium or calcium carbonate content (Belnap et al. 2001), such as those in the planning area.

3.15.4 Farmlands

Prime and unique farmlands are classified by the NRCS as lands that are used for the production of high-value food and fiber crops. These lands have the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops (Soil Survey Division Staff 2017). There are no prime or unique farmlands in the planning area. Land that is still used to produce food and fiber crops—but does not quite meet the criteria for prime or unique farmland—is classified as farmland of statewide importance. This land can economically produce high yields of crops when treated and managed according to acceptable farming methods. In the planning area, soil map units 311—Gynelle-Cirac association and 455— Cirac-Kawich association (approximately 4,010 acres, or 6.5 percent of the planning area) are classified by the NRCS as farmlands of statewide importance, if they are irrigated.

3.15.5 Reclamation Potential and Topsoil Quality

All soils in the planning area are rated as poor for reclamation material and as a topsoil source, due to their high salinity, sodium, or carbonate content; sandiness; dryness; low organic matter content; or a combination of these factors (NRCS 2023a). High salinity can limit the ability of plant roots to absorb water; high sodium content can cause clay dispersion, which decreases soil aggregation and soil water-holding capacity (NRCS 2009). High carbonate content often corresponds with a high pH, which can limit soil nutrient availability for plant uptake (Weil and Brady 2019). Soils that are too sandy and dry drain easily and retain less moisture.

3.16 Transportation, Access, and Public Safety

The transportation system in the planning area includes approximately 89 miles of federal, state, and public roads (see **Table 3-26**). These include US Highways 6 and 95, SR 265, Emigrant Pass Road, Nivloc Road, and 60.4 miles of unnamed public roads. US Highway 95 and US Highway 6 combine as one highway at Coaldale Junction (see **Figure 3-17**, Existing Roads, **Appendix A**), which is west of the planning area. The combined US Highway 6/95 is a two-lane, undivided highway with intermittent passing lanes, and the speed limit is 70 miles per hour. In the planning area, US Highway 6/95 intersects the Lone Mountain Solar project area and crosses through the southern portions of the Nivloc Solar and Smoky Valley Solar project areas.

SR 265 connects Silver Peak, Nevada (south of the planning area), to US Highway 6/95. It is a two-lane, undivided highway, and the speed limit is 70 miles per hour. In the planning area, SR 265 is adjacent to the eastern boundaries of the Lone Mountain Solar and Esmeralda Energy Center Solar project areas and the western boundary of the Nivloc Solar project area. Emigrant Pass Road and Nivloc Road are used to access the Red Ridge 1 Solar project area and the Nivloc Solar project area, respectively. Speed limits for county roads are 45 miles per hour unless otherwise posted.

Table 3-26. Miles of Road Segments in the Planning Area

Road Segment	Miles
US Highway 6/95	9.6
SR 265	6.4
Emigrant Pass Road	6.5
Nivloc Road	6.4
Unnamed public roads	60.4
Total	**89.3**

Source: US Census GIS 2022

Federal and state highways and county roads in Esmeralda County require regular maintenance because of heavy use, such as trucks, and weather conditions, such as snow and freeze-thaw cycles (Esmeralda County 2011). On unpaved county roads, excessive speed will cause wash-boarding (Esmeralda County 2011), a degraded road condition whereby vehicle tires cause a series of ripples that make the road rough to drive over.

Table 3-27 shows traffic data for US Highway 6/95 and SR 265 from three Nevada Department of Transportation traffic stations. Traffic is measured as average annual daily traffic (AADT), which is the total volume of vehicle traffic for a year divided by 365 days; this gives an estimate of the average daily traffic. SR 265 receives much less traffic than US Highway 6/95.

Table 3-27. Average Annual Daily Traffic (AADT) between 2020 and 2022

Road Segment	Description	Direction	Station ID	Latitude	Longitude	2020 AADT	2021 AADT	2022 AADT
US Highway 6/95	From the Esmeralda-Nye County line to the intersection with SR 265	Westbound	0092110	38.13	-117.41	2,200	2,700	2,650
US Highway 6/95	From SR 265 to Coaldale Junction	Westbound	0090013	38.02	-117.78	2,850	3,000	2,450
SR 265	From 6 miles south of US Highway 6/95 to Sliver Peak, Nevada	Southbound	0090014	38.02	-117.78	80	260	100
US Highway 95	From 6 miles north of US Highway 6 toward Mineral County	Northbound	0090018	38.04	-117.89	1,950	2,950	2,800
US Highway 6	From the US Highway 6 intersection with SR 264 to Coaldale Junction	Eastbound	0090019	38.01	-118.10	380	470	480

Sources: NDOT 2022a, 2022b

3.17 Visual Resources, including Night Skies

The analysis area for visual resources is the planning area, which encompasses approximately 62,300 acres of BLM-administered land in Esmeralda County. It is approximately 30 miles west of Tonopah, Nevada. The BLM administers these public lands in accordance with the 1997 Tonopah RMP. This section provides a summary of the VRM and existing conditions within the planning area as detailed in the Visual Resources Supplemental Environmental Report (BLM 2024h).

The BLM has the responsibility to manage lands in a manner that will protect the quality of scenic values under FLPMA. The BLM meets statutory requirements with the VRM program described in BLM Manual 8400, Visual Resource Management; Handbook 8410-1, Visual Resource Inventory (BLM 1986a); and Handbook 8431, Visual Resource Contrast Rating (BLM 1986b). The VRM program establishes national consistency for inventorying, planning, and managing the qualities of BLM-administered lands' visual resources.

The BLM manages visual resources via the planning objectives determined during the land use planning process with careful analyses of the visual resource inventory, other resource values, and other potential land use demands. Allowable uses and management actions must be planned in accordance with these planned management objectives. The VRM classes describe the limits of allowable visual change to the characteristic landscape. Proposed management activities must comply with the VRM classes.

The visual resource inventory process provides BLM managers with a means for determining visual values. The inventory consists of a scenic quality evaluation, sensitivity level analysis,[30] and delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes. These inventory classes represent the relative value of the visual resources. Classes I and II are the most valued, Class III represents a moderate value, and Class IV is of least value (BLM 1986a). Most of the lands in the analysis area are visual resource inventory Class III (**Table 3-28**, below). There are no visual resource inventory Class I lands in the planning area.

Table 3-28. Visual Resource Inventory Classes

Visual Resource Inventory Class	Acres
II	460
III	40,680
IV	21,140
Total	**62,280**

Source: BLM GIS 2023

The inventory classes provide the basis for considering visual values in the resource management planning process. VRM classes are established through the resource management planning process for all BLM-administered lands. During the resource management planning process, the class boundaries are adjusted as necessary to reflect the resource allocation decisions made in RMPs (BLM 1986a). Most lands in the analysis area are VRM Class IV (**Table 3-29**, below). There are no VRM Class I or II lands in the planning area.

Table 3-29. Visual Resource Management Classes

VRM Class	Acres
III	9,840
IV	52,440
Total	**62,280**

Source: BLM GIS 2023

[30] In the planning area, there are 41,140 acres with a high rating for sensitivity and 21,140 acres with a low rating for sensitivity. There are no acres with a moderate rating for sensitivity (BLM GIS 2023).

The planning area is in the Southern Nevada Basin and Range major land resource area (MLRA), which is MLRA 29 (NRCS 2022). The MLRA is in the Great Basin, which is characterized by broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The MLRA's basins are bordered by sloping fans and terraces. Its mountains are uplifted fault blocks with steep side slopes.

The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more saltbush species. There is also open to moderately dense shrublands dominated or codominated by greasewood, as well as barren and sparsely vegetated playas. A relatively large, dry playa lake borders the northern boundary of the planning area. This is the Big Smoky Valley playa. This feature may flood during periods of substantial rainfall and provide unique habitat for some species. Vegetation visible in the planning area is further described in **Section 3.2.4**, Vegetation.

The planning area is primarily viewed from roadways and trails. US Highway 95 and SR 265 bisect the planning area. Vehicles traveling along them are the primary sources of nighttime light. Nevada Historical Landmark 155 is visited by travelers at the intersection of US Highway 95 and SR 265. Vehicles provide most of the artificial light and glare in the planning area.

Dirt roads crisscross the planning area; some of these are used under a SRP for the Vegas to Reno off-road race. Additionally, dirt roads, hiking trails, and peaks surrounding the planning area afford views of the BLM-administered lands. Road signs, fences, and litter are also visible in the planning area.

3.18 Wastes and Materials (Hazardous and Solid)

Proper waste management is an essential component of society's public and environmental health (EPA 2023a). The 1976 Resource Conservation and Recovery Act (RCRA; 42 USC 6901 et seq.) creates the framework for hazardous and solid waste management programs and applies to the generation, storage, treatment, or disposal of solid and hazardous wastes. The RCRA sets up a system through which hazardous waste generators are responsible for hazardous waste management from cradle to grave. This means hazardous waste generators are responsible for the identification, transportation, treatment, storage, and disposal of solid and hazardous wastes (BLM 2009b).

The RCRA defines a solid waste as any garbage or refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities. The RCRA defines a hazardous waste as a solid waste that exhibits one of the following four characteristics: ignitability, corrosivity, reactivity, or toxicity (40 CFR 261–262).

The NDEP, Bureau of Waste Management protects human health, public safety, and the environment from the effects of improper, inadequate, or unsound management of hazardous waste; establishes programs for regulation of the storage, generation, transportation, and treatment and disposal of hazardous waste; and ensures safe and adequate management of hazardous waste (Nevada Revised Statues 459.400).

The area of analysis for wastes and materials is the planning area, which is mainly undeveloped desert land and rangeland with some transmission line routes, roads, and other ROWs (see **Section 3.7**, Lands, Realty, and Cadastral Survey). Activities within the planning area include livestock grazing, dispersed recreation, and one SRP. There are several minerals claims but limited activity, with one geothermal observation well drilled in 2010 and permits to the Nevada Department of Transportation for sand or gravel for road construction and maintenance.

The planning area does not contain known hazardous substances or petroleum products. During site reconnaissance conducted in the Red Ridge 1 Solar, Red Ridge 2 Solar, and Smoky Valley Solar project areas, no evidence of hazardous materials or petroleum products was observed. These reviews included an evaluation of the project areas' physical setting; historical resources; hazardous material pipelines; hazardous waste cleanup sites; and vapor encroachment, which is the presence of chemicals in the subsurface of a property caused by the release of vapors from contaminated soil or groundwater on or near a property (Converse 2023; Stantec 2022h, 2022i).

3.19 WILD HORSES AND BURROS

The Wild Free-Roaming Horses and Burros Act of 1971, as amended by FLPMA and the Public Rangeland Improvement Act of 1978 and modified by the Fiscal Year 2005 Omnibus Appropriations Act (Public Law 108-447), directs the protection and management of wild horses and burros on BLM-administered lands. Responsibility for wild horse and burro management is governed by 43 CFR 4700. One of the BLM's top priorities is to ensure the health of the public lands so that the species depending on them, including the nation's wild horses and burros, can thrive. The BLM policies and regulations also direct that wild horses and burros are to be managed as self-sustaining populations of healthy animals.

When the Wild Free-Roaming Horses and Burros Act was passed, the areas in which wild horses and burros were found were designated as herd areas. A subset of these herd areas was determined to be suitable for long-term management; these are known as HMAs. Wild horses and burros within HMAs are managed with the goal of maintaining sustainable ecological conditions and multiple-use relationships on federal lands through appropriate management levels (AMLs). AMLs are defined as the median number of adult wild horses or burros determined through the BLM's planning process to be consistent with the objective of achieving and maintaining a thriving natural ecological balance and multiple-use relationship in a particular herd area. AMLs are presented as a range where the upper limit represents the maximum number of adult horses and burros that result in a thriving natural ecological balance and avoids deterioration of the range. The lower limit is set at a number that will still allow the population to grow to the upper limit within 4–5 years without any interim gathers (BLM 2010). HMAs can include private or state lands, but the BLM has management authority only over public lands and only manages for wild horses and burros within HMAs.

The estimated population size of wild horses and burros within each HMA is based on helicopter, fixed-wing, or ground-based inventories. These population inventories provide information pertaining to population numbers, foaling rates, distribution, and herd health. When the AML is exceeded, populations of wild horses and burros are examined to determine whether population-control methods are required, including gathers, removals, and fertility control.

There is one HMA that overlaps the planning area for a total of 510 acres (see **Table 3-30**). These acres are only BLM-administered lands. The Silver Peak HMA is not designated for horses; it allows for 4–6 burros (see **Table 3-30**). However, the estimated population within the HMA consists of 18 horses and currently no burros. These numbers are representative of the entire HMA, including areas that are outside the planning area. The BLM does not manage the horse population in this HMA except through periodic removals. The last gather in the Silver Peak HMA was completed in March 2021.[31]

Table 3-30. Herd Management Areas within the Planning Area

HMA	Total Acres	Total BLM-Administered Acres	Acres in the Planning Area	AML	Estimated Population
Silver Peak	242,462	239,801	510	4–6 (burros)	0 (burros) 18 (horses)

Sources: BLM GIS 2023; BLM 2024i

[31] https://www.blm.gov/sites/default/files/docs/2024-03/2024_HMA-HA_PopStats_2-29-2024_COMBINED_Clean_FINAL_web.pdf

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Chapter 4. Environmental Consequences

The Proposed Action and Alternative B outlined in **Chapter 2** may cause changes in the human environment. This PEIS/RMPA analyzes these potential changes and discloses the effects to the decision-makers and public. This process of disclosure is one of the fundamental aims of NEPA. Effects, or impacts, are changes to the human environment because of the Proposed Action or alternatives. This chapter describes the potential effects from the Proposed Action, the Soils and Vegetation Conservation Alternative, and the No Action Alternative. The Proposed Action is based on the reasonably foreseeable development outlined in the seven plans of development for each project and summarized in the Supplemental Information Report (BLM 2024b). The programmatic approach to this analysis assumes all seven projects would be developed and ground-disturbing activities would be the total of the maximum disturbance acres estimated for each project.

Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic (such as the effects on employment), social, and health effects. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes the effect would be beneficial (40 CFR 1508.1). The terms "impacts" and "effects" are used interchangeably, and the terms "increase" and "decrease" are used for comparisons. Impacts are described in terms of location, duration, and potentially affected environment.

The geographic scale of the effects is defined as the planning area (**Figure 1-1**, **Appendix A**) unless otherwise noted.

Each ROW may be permitted for 50 to 60 years, depending on maintenance operations and climatic conditions. It is assumed that the projects would cease operations and decommission the sites at or near the 50-year period. An additional 5 years would be allowed for site restoration after decommissioning. For the purposes of this analysis, the duration (temporal scale) of the effects is defined below.

- Short-term/temporary effects: These are impacts that would last up to 7 years for construction and 5 years for site restoration.
- Long-term effects: These are impacts that would generally cover the operational phase of the solar facilities and would be greater than the 12 total years for construction and restoration.

Direct, indirect, and cumulative impacts of the Proposed Action and alternatives are analyzed in this chapter. Direct impacts are impacts that are reasonably foreseeable, have a causal relationship, and occur at the same time and place as the Proposed Action or alternatives. Indirect impacts include effects that are later in time or farther removed in distance from the Proposed Action or alternatives. Design features (**Appendix B**) and other measures to avoid, reduce, or otherwise offset impacts are considered in the analysis.

Cumulative impacts are the effects on the environment that result from the incremental impact of the Proposed Action or alternatives when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions (40 CFR 1508.7; CEQ 2024). To determine which other actions should be included in a cumulative impacts analysis, the region of influence for each resource must first be defined. The regions should not be limited to only the geographic areas of resources addressed by the project; they should also account for the distances that cumulative impacts may travel and the regional characteristics of the affected resources. The cumulative effects areas are shown on **Figure 4-1**, **Appendix A** and listed in **Table 4-1**. Reasonably foreseeable actions that fall within the cumulative effects areas are outlined in **Table 4-2**.

Table 4-1. Cumulative Effects Study Area by Resource Topic

Resource Topic	Cumulative Effects Study Area (CESA)
Air quality and climate	31 miles out from the planning area
Biological resources	12-digit HUC sub-watersheds that overlap the planning area
Cultural resources	Out 10 miles from the planning area
Forestry	12-digit HUC sub-watersheds that overlap the planning area
Geology and minerals	Planning area
Hydrologic resources	12-digit HUC sub-watersheds that overlap the planning area
Lands, realty, and cadastral survey	Planning area
Lands with wilderness characteristics	Out 10 miles from the planning area
Native American concerns	Out 10 miles from the planning area
Noise	Out 10 miles from the planning area
Paleontological resources	Planning area
Rangeland – grazing management	Grazing allotments that overlap the planning area
Raptors	Out 10 miles from the planning area
Recreation	Out 10 miles from the planning area
Social values, economics conditions, and EJ	Esmeralda, Lyon, Mineral, and Nye Counties in Nevada and Mono and Inyo Counties in California
Soils	12-digit HUC sub-watersheds that overlap the planning area
Transportation, access, and public safety	Planning area (also see the Social Values section and discussion of commuter boundary of 90-minute drive)
Visual resources, including night skies	Area that includes 10 miles out from the planning area
Wastes and materials (hazardous and solid)	Planning area
Wild horses and burros	HMAs that overlap the planning area

Table 4-2. Reasonably Foreseeable Future Actions

Reasonably Foreseeable Action	Brief Description of Action	Planning Area CESA[1]	Air CESA[1]	Biological CESA[1]	Cultural CESA[1]	Hydrologic CESA[1]	Social and Economic CESA[1]	Visual CESA[1]
Greenlink West/NV Energy	NV Energy has proposed a system of new 525, 345, and 120 kV electric transmission facilities on private, state, and federal lands between northern and southern Nevada. The project will run from Las Vegas to Reno through Clark, Nye, Esmeralda, Mineral, Lyon, Story, and Washoe Counties. The transmission corridor crosses 10 miles of the planning area.	370 acres[2] 10 miles	4,050 acres[2] 80 miles	1,770 acres[2] 40 miles	1,770 acres[2] 40 miles	1,770 acres[2] 40 miles	1,860 acres[2] 40 miles	25,600 acres[2] 40 miles
Western Bounty/Gallatin Power	Gallatin Power has proposed a direct current transmission line.	480 acres[3] 10 miles	9,200 acres[3] 150 miles	1,080 acres[3] 30 miles	3,610 acres[3] 60 miles	1,080 acres[3] 30 miles	9,200 acres[3]	19,200 acres[3] 30 miles
Sierra Pacific Power	Transmission ROW	59.6	59.6	59.6	59.6	59.6	59.6	59.6
Ormat Nevada	Transmission ROW	1,418	1,418	1,418	1,418	1,418	1,418	1,418
Sierra Pacific Power Company	Transmission ROW	—	178.4	—	—	—	178.4	—
Valley Electric Associates Inc	Transmission ROW	—	267.85	—	—	—	267.85	—
Sierra Pacific Power Company	Transmission ROW	—	124.12	—	—	—	124.12	—
Sierra Pacific Power Company	Transmission ROW	—	610.9	—	—	—	610.9	—
US Department of Energy	Transmission ROW	—	756.58	—	—	—	756.58	—
Mt. Wheeler Power	Transmission ROW	—	397	—	—	—	397	—
Sierra Pacific Power Company	Transmission ROW	—	—	—	—	—	4,332.81	—
Los Angeles Department of Water and Power	Transmission ROW	—	—	—	—	—	4,173.76	—
Sierra Pacific Power Company	Transmission ROW	—	—	—	—	—	4,900	—

Reasonably Foreseeable Action	Brief Description of Action	Planning Area CESA[1]	Air CESA[1]	Biological CESA[1]	Cultural CESA[1]	Hydrologic CESA[1]	Social and Economic CESA[1]	Visual CESA[1]
Gridliance West LLC	Transmission ROW	—	—	—	—	—	192.9	—
Sierra Pacific Power Company	Transmission ROW	—	—	—	—	—	300	—
Bonanza Peak Solar LLC	Transmission ROW	—	—	—	—	—	178.4	—
American Glory	Solar ROW	6,921	6,921	6,921	6,921	6,921	6,921	6,921
Ormat Nevada	Geothermal lease	5,078	5,078	5,078	5,078	5,078	5,078	5,078
Baseload Power US Holdings	Geothermal lease	4,884	4,884	4,884	4,884	4,884	4,884	4,884
Ram Power	Geothermal lease	40,092	40,092	40,092	40,092	40,092	40,092	40,092
Various	Geothermal leases and utilizations sites	—	3,611	—	—	—	3,611	—
Vegas to Reno OHV SRP	The Best in the Desert Vegas to Reno desert OHV race is an event held on BLM-administered lands managed by the Tonopah, Stillwater, and Sierra Front Field Offices. It covers approximately 521 miles. The race occurs on 1 day, but public access to the race area may be impeded by race use for 2 days (the day of the race and the prior day).	10 miles	230 miles	270 miles	50 miles	270 miles	340 miles	60 miles
Naturgy Candela Devco	Solar development	5,725	5,725	5,725	5,725	5,725	5,725	5,725
Vanderbilt Minerals Corp	Road ROW	8.5	8.5	8.5	8.5	8.5	8.5	8.5
AT&T	Telephone ROW	797.8	797.8	797.8	797.8	797.8	797.8	797.8
Valley Electric	Telephone/communication ROW	—	—	—	—	—	170	—
Department of Energy	ROW	—	16,291	—	—	—	16,291	—
Rulco LLC	Potassium prospect	2,534	2,534	2,534	2,534	2,534	2,534	2,534
Global Silica	Mining	—	540	—	540	—	540	540
Ioneer USA Corp	Mining	—	624	—	624	—	624	624

Reasonably Foreseeable Action	Brief Description of Action	Planning Area CESA[1]	Air CESA[1]	Biological CESA[1]	Cultural CESA[1]	Hydrologic CESA[1]	Social and Economic CESA[1]	Visual CESA[1]
Allegiant Gold	Mining	—	—	—	—	—	300	—
Various	Mining plans and exploration	—	—	—	—	—	35,936	—
American Battery Technology Company	Lithium mining	—	—	—	10,340	—	10,340	10,340
Kinross Gold	Hard-rock mining and exploration	—	7,673	7,673	7,673	7,673	7,673	7,673
Authium LLC	Hard-rock mining and exploration	—	100	100	—	100	100	100
Neolith Energy	Lithium mining	—	1,280	1,280	1,280	1,280	1,280	1,280
Centrestone Resources LLC	Mining	—	1,295	1,295	1,295	1,295	1,295	1,295
Allegiant Gold	Mining	—	300	300	300	300	300	300
Authium LLC	Hard-rock mining/exploration	—	100	100	100	100	100	100

Source: BLM GIS 2023
[1]Size in acres unless noted
[2]Acres of Greenlink West with 200-foot buffer across the CESA
[3]Acres of Western Bounty with 250-foot buffer across the planning area
An em dash denotes "not applicable."

4.1 Air Quality and Climate

4.1.1 Analysis Methods and Assumptions

Air emission sources include combustion exhaust from on-road vehicles, such as construction worker vehicles, concrete haul trucks, construction waste haul trucks, and construction equipment, such as backhoes, loaders, graders, pumps, and generators. Air emissions may also occur as a result of vehicle activity on unpaved surfaces and fugitive dust from grading. Emission estimates are based on the total disturbed area, the on-site equipment, and the number of vehicle trips for each of the seven facilities. Where information is unavailable for a given facility, the emission estimate has been calculated based on the ratio of the total acreage and wattage capacity of the unknown project to that of a project with known values. The emissions inventory is being used to inform the Air Dispersion Modeling Analysis (Trinity Consultants) which is found in Appendix C of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

Dispersion modeling of the air emissions generated during construction was conducted to determine the maximum concentrations of criteria pollutants within the ambient air boundary (the entire boundary of the seven project sites) and an additional 6-mile radius surrounding the boundary. The dispersion modeling was conducted to evaluate compliance with the NAAQS and NVAAQS.

This analysis makes the following assumptions:

- The precise timing for project startup and construction would be determined during the site-specific NEPA analysis. The analysis conservatively assumes that the maximum surface disturbances, vehicle travel, and on-site combustion equipment use (such as, loaders, excavators, and generators) would occur during construction and could happen concurrently throughout the planning area. Additional information for each project was provided in the project's plan of development.
- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario and each project's plan of development. The precise location and arrangement of facility components within each project area and, thus, the total acres of surface disturbance in each project area, will be determined during the site-specific NEPA analysis. Therefore, the analysis conservatively assumes that soils and vegetation within the entire project area would be disturbed in the short term, during and shortly after construction. Interim reclamation would take place on portions of cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. Direct effects on air quality would occur at the project areas during construction and O&M of the proposed facilities. Indirect effects could occur farther away from the project areas.

For construction, operation, and decommissioning, impacts would be minimized through the implementation of programmatic design features (see **Section B.1** of **Appendix B**).

Consistent with the methodologies proposed in the PEIS, air dispersion modeling was only conducted for the construction phase of the project. To evaluate worst-case emissions impacts, the modeling assumed construction of all seven projects simultaneously.

Additional details regarding the impacts on air resources are provided in Section 3.4 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

4.1.2 Alternative A. Proposed Action

Construction

Air Quality

Potential impacts on ambient air quality associated with a solar project would be of most concern during the construction phase, which would be completed within 5 years. During construction, fugitive dust from soil disturbances and engine exhaust from heavy equipment and commuter, delivery, and support vehicular traffic within and around the facility would contribute to air emissions of criteria pollutants, volatile organic compounds, GHGs, and a small amount of HAPs. Typically, potential impacts of fugitive dust emissions on ambient air quality would be higher than those of engine exhaust emissions. **Table ES-1** summarizes the annual criteria pollutant emissions associated with the construction of the Esmeralda 7 projects.

Table 4-3. Annual Criteria Pollutant PTE Emissions Summary (tpy) - Esmeralda Energy Center Construction

Source	PM	PM_{10}	$PM_{2.5}$	Volatile Organic Com-pounds	Nitrogen Oxides	CO	SO_2	CO_2e	Total HAPs
On-road vehicles - construction vehicles	0.09	0.09	0.03	0.19	1.61	2.87	0.00	1,082.25	0.05
On-road vehicles - employee commuting	0.28	0.28	0.09	1.77	1.02	27.73	0.02	3,167.04	0.65
Off-road equipment	0.26	0.26	0.26	9.37	2.19	27.26	7.57	4,231.75	0.10
Unpaved roads	38.79	10.47	1.05	--	--	--	--	--	--
Fugitive dust from construction activities[1]	2,910.60	2,910.60	291.06	--	--	--	--	--	--
Total	2,950.01	2,921.69	292.48	11.33	4.82	57.86	7.60	8,481.05	0.80

The maximum ambient concentrations of 24-hour PM_{10} and 24-hour $PM_{2.5}$ would exceed the NAAQS/NVAAQS. However, the emissions calculations and modeling methodology assume a worst-case scenario where all construction equipment operates concurrently, and all construction activities occur concurrently at all seven of the individual project sites. This worst-case scenario is unlikely to occur in practice. The results of the ambient impact analysis are shown in **Table 4-4**. For each pollutant, **Table 4-4** includes the averaging period, the form of the standard, and a comparison to the NAAQS and NVAAQS.

Table 4-4. NVAAQS/NAAQS Model Results

Modeled Pollutant	Design Value	Modeled Impacts (μg/m³)	Background (μg/m³)	Impacts and Background (μg/m³)	NAAQS (μg/m³)	Impacts below NAAQS	NVAAQS (μg/m³)	Impacts below NVAAQS
PM_{10} 24 hours	H2H/H1H[1]	313.1/692.7	10.2	323.3/702.9	150	No	150	No
$PM_{2.5}$ 24 hours	H8H	28.6	7.0	35.6	35	No	35	No
$PM_{2.5}$ annual	Max avg	7.8	2.3	10.1	12	Yes	12	Yes
NO_2 1 hour	H8H	16.1	64.9	81.0/16.1	188	Yes	188	Yes
NO_2 annual	Max	0.2	6.4	6.6/0.2	100	Yes	100	Yes
SO_2 1 hour	H4H	17.7	1.3	19.0/17.7	196	Yes	196	Yes
SO_2 3 hours	H2H/H1H[2]	9.6/14.2	1.3	10.9/14.2	1,300	Yes	1,300	Yes
SO_2 24 hours	H1H	3.5	0	3.5	—	—	365	Yes
SO_2 annual	Max	17.66	0	17.66	—	—	80	Yes
CO 1 hour	H2H/H1H[2]	94.7/128.63	2520	2,614/128.63	40,000	Yes	40,500	Yes
CO 8 hours	H2H/H1H[2]	25.7/30.33	1948	1,973.7/30.33	10,000	Yes	10,500	Yes

[1] The form of the standard for NAAQS is H2H (not to be exceeded more than once per year for 1 year of meteorological data) and the form of the standard for NVAAQS is H1H.
[2] The form of the standard for NAAQS is H2H and the form of the standard for NVAAQS is H1H.

Impacts would be minimized through the implementation of programmatic design features, as discussed in Section 1.2.5 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c). A Surface Area Disturbance permit would be obtained for the Proposed Action, via submittal of the NDEP's Class II Air Quality Operating Permit Application Form Surface Area Disturbance application. NAC 445B.22037 requires that fugitive dust be controlled (regardless of the size or amount of acreage disturbed) and requires an ongoing program, using best practical methods, to prevent particulate matter from becoming airborne. All activities that have the potential to adversely affect the local air quality must implement all appropriate measures to limit controllable emissions.

Appropriate measures for dust control may consist of a phased approach to acreage disturbance rather than disturbing the entire area all at once, using wet suppression through such application methods as water trucks or water spray systems to control wind-blown dust, the application of soil-binding agents or chemical surfactant to roadways and areas of disturbed soil, and the use of wind-break or wind-limiting fencing designed to limit wind-eroded soils (NDEP 2022). The Surface Area Disturbance permit application requires the applicant to indicate which BMPs will be used to control dust on the project's disturbed areas. The finalized BMPs would be disclosed during the site-specific NEPA analysis.

In addition, a fugitive dust-control plan would be prepared for each project in compliance with NDEP air quality regulations. This plan would describe measures to minimize fugitive dust emissions during construction and operations. Appropriate erosion- and dust-control measures would be implemented to comply with Esmeralda County dust-control requirements, as discussed in Section 2.4 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c). Dust during construction would be controlled and minimized by applying water or BLM-approved palliatives, or both.

The BMP requirements in the Surface Area Disturbance permit, the fugitive dust-control plan, the Esmeralda County requirements, and implementation of programmatic design features would overlap and ensure that appropriate and effective dust-control measures would be implemented during the Proposed Action. Therefore, no adverse effects or significant deterioration would occur in the planning area.

Climate Change

The proposed GHG emission sources would include temporary sources during the construction phase, such as worker and construction vehicles and stationary internal combustion engines (pumps and generators). Indirect downstream GHG emissions typically include the GHG emissions generated during transport and delivery of product materials. For individual sites, construction GHG emissions would range from about 7,000 to 21,500 tpy of CO_2e, totaling 90,300 tpy of CO_2e for all sites combined. Per the EPA's GHG Equivalencies Calculator, the maximum amount of GHG emissions generated in a single year during construction of the Proposed Action would be the same amount as that produced by 10,325 households from energy consumption annually (EPA 2023b).

Construction of the Proposed Action would contribute CO_2e over a period of 5 years; climate change is a long-term phenomenon. As discussed below, operation of the projects would avert CO_2e emissions that would otherwise be generated by fossil fuels. As such, the short-term construction emissions would be offset by the long-term benefits of the operation of solar facilities. Therefore, 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 and would not have adverse or significant impacts.

Operation

Air Quality

During the operations phase, only a few sources with generally low-level emissions would exist. The solar facilities would either not burn fossil fuels or they would burn only small amounts during operation. Conversely, the solar facilities would displace air emissions that would otherwise be released from fossil fuel power plants. Emissions from the solar facilities' operations would include fugitive dust and engine exhaust emissions from vehicles and heavy equipment associated with regular site inspections, infrequent maintenance activities, and wind erosion from bare grounds and access roads (BLM and DOE 2012). Emissions would also depend on the solar technology used; they could include criteria pollutants and HAPs from small boilers, space heating boilers, emergency power generators (typically only operating a few hours a month), and emergency fire water pumps. Therefore, no adverse effects or significant deterioration would occur in the planning area from operations.

Climate Change

With a 6,200 MW nameplate capacity, the Proposed Action would generate 15.1 million megawatt hours of electricity per year. Further, the Proposed Action would avert over 7 million metric tons of CO_2e that would otherwise be generated by fossil fuels. This equates to the CO_2 emissions coming from annual electricity consumption in 1.37 million homes or from driving 1.56 million gasoline-powered passenger vehicles for a year (EPA 2023c). Not only would the Proposed Action significantly increase the nameplate capacity of solar-generating facilities in Nevada, but it would also accelerate the shift to renewable energy.

Since generation of electricity from solar energy does not require combustion, the replacement of fossil fuels by the Proposed Action's PV solar energy would reduce the rate of GHG emissions, thereby minimizing the effects of global warming (EIA 2022c). As a result, the Proposed Action could decrease the risk of climate change-related events including droughts, floods, and other natural disasters. Potential air emissions offset by the Proposed Action would be much higher than the air emissions generated by operations (or construction). Compared to non-renewable energy generation, the projects would not entail any significant adverse impacts; rather, it would positively contribute to the reduction of GHG emissions.

Additional details regarding the impacts on climate change from the projects are included in Section 4.3 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

Decommissioning/Reclamation

Air Quality

As discussed in the Solar RMPA (BLM 2012), decommissioning and reclamation activities would be similar to those during construction but they would occur on a more limited scale and for a shorter duration. Additionally, air quality impacts would be minimized due to less fleet turnover, increases in efficiency, and use of alternative fuels during decommissioning. Potential impacts on ambient air quality would be correspondingly less than those from construction activities. Decommissioning activities would last for a short period, and their potential impacts would be moderate and temporary.

Climate Change

Decommissioning activities would be similar to those during construction; however, they would occur on a more limited scale and over a shorter time frame. Therefore, GHG emissions and climate change impacts would be proportionally smaller than those from construction activities.

4.1.3 Alternative B. Soils and Vegetation Conservation Alternative

Air Quality

Similar to the Proposed Action, potential impacts on ambient air quality associated with Alternative B would be of most concern during the construction phase. However, under Alternative B, impacts associated with construction would be substantially less than those associated with the Proposed Action. Under Alternative B, traditional construction grading methods would be limited to a maximum of 35 percent of the proposed development area. Compared with the Proposed Action, this would result in a reduction of the potential for generation of fugitive dust from soil disturbances and engine exhaust from heavy equipment used to perform vegetation removal and grading. In addition, Alternative B would leave vegetation in 65 percent of the development area intact; as such, emissions associated with decommissioning and reclamation activities are expected to be substantially less than those associated with Proposed Action.

Alternative B would not differ materially from Alternative A during the operation phase. As such, the information presented in Section 3.4.2 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c). regarding the operation phase impacts, BMPs, and mitigation measures would also be applicable for Alternative B. Alternative B would incorporate the same programmatic design features and dust-control measures described in Section 3.4.2 of the Air Quality and Climate Change Supplemental Environmental Report (BLM 2024c).

Climate Change

The impacts of direct GHG emissions under Alternative B would be substantially less than those associated with the Proposed Action. This is because the on-site combustion equipment associated with traditional grading methods would be limited to a maximum of 35 percent of the proposed development area. Compared with the Proposed Action, this would limit engine exhaust from heavy equipment used to perform vegetation removal and grading. In addition, because the social cost of GHG is based on an incremental metric ton of emissions in a given year, the social cost of GHG from the construction emissions of Alternative B would be less than it would be under the Proposed Action. Compared to the

GHG reductions in the first operational year of the Proposed Action, the difference in GHG impacts from construction between Alternative B and the Proposed Action become negligible.

Indirect GHG emissions under Alternative B would be similar or less than those under the Proposed Action. Alternative B would be accomplished in the same amount of time, or potentially a shorter time period, as the Proposed Action; as such, the construction timeline associated with Alternative B would not negatively impact a switch to cleaner fuels.

4.1.4 Alternative C. No Action Alternative

Under Alternative C, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. Effects on direct and indirect air quality emissions would not occur at the levels or timeframes described under the Proposed Action. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation on existing roads, highway vehicle use, and road maintenance, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized impacts on air quality. Effects from the solar projects on direct GHG emissions would not occur at the levels or timeframes described under the Proposed Action. Ongoing use of fossil fuels for electricity generation in Nevada would continue to result in emissions of over 7 million metric tons of CO2e for the 15.1 million megawatt hours of electricity not generated under the Proposed Action. This would contribute to ongoing, localized, and global impacts on climate change.

4.2 Cumulative Effects Analysis

4.2.1 Air Quality and Climate

CESA Boundary Description

The CEQ defines cumulative effects as "the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal and non-federal) or person undertakes such other actions" (40 CFR 1508.7; CEQ 2024). The CESA for air quality and climate encompasses the planning area as well as an additional 31-mile radius surrounding it, to capture regional sources of emissions.

The BLM determined information on other activities within the cumulative assessment boundary for the air resources out from the planning area. The BLM's review focused on commercial mining with plans of operation (greater than 5 acres of disturbance) and large-scale utility projects, such as the Greenlink West and Western Bounty transmission lines.

Given that specific information on the activities included in the BLM's review is limited, the cumulative analysis is focused on the types of actions and overall acres of disturbance. Industrial sources within 31 miles were screened based on an emission-over-distance screening technique (the "20D" procedure) to identify small and distant sources that could be excluded from the analysis because they are not anticipated to impact receptors in the project area (57 Federal Register 8079).

Past, Present, and Reasonably Foreseeable Future Actions

Any off-site impact calculated in the Air Dispersion Modeling Analysis (Trinity Consultants 2024) that is greater than the significant impact limit for a given pollutant, a NAAQS and/or increment analysis incorporating nearby sources is required. The initial off-site inventory radius would be the radius of the largest pollutant-specific significant impact area to a maximum distance of 31 miles (50 km) from the facility. Under EPA's guidance in Section IV.C.1 of the draft New Source Review Manual applicable to "deterministic" NAAQS, all sources within the significant impact area, no matter how small or distant, would be included in the regional inventory. The remaining sources outside of the significant impact area but within 31 miles (50 km) would be assumed to potentially contribute to ground-level concentrations within the significant impact area and would be evaluated for possible inclusion in the NAAQS analysis. For purposes of this evaluation, off-site inventory data was obtained from the following sources:

- The EPA's 2020 National Emissions Inventory data
- NDEP's GIS map
- NDEP public document search

Sources from the raw inventories were initially screened in the three neighboring counties (that is, Esmeralda, Mineral and Nye counties). Facilities falling outside the 31-mile (50 km) radius were removed from the analysis. The remaining sources within the initial 31-mile (50 km) screening distance were then screened based on an emission (Q) over distance (d) screening technique such as the "20D" procedure to identify small and distant sources that could be excluded from the NAAQS analysis because they are not anticipated to impact receptors in the significant impact area. Using the "20D" screening procedure, sources were excluded from the inventories for the short- and long-term averaging periods if the entire facility's emissions (tpy) are less than 20 times the distance (km) from the facility (Q/d less than 20).

The Q/d for all sources evaluated within the 31-mile (50 km) radius is less than 20; therefore, they are not expected to impact ambient air concentrations in the projects vicinity. Additional details regarding the analysis are provided in the Air Dispersion Modeling Analysis (Trinity Consultants 2024).

Cumulative Effects

Alternative A. Proposed Action

Esmeralda County is currently classified as in attainment or unclassifiable for the NAAQS for all criteria pollutants. The maximum concentration of 24-hour PM_{10} and 24-hour $PM_{2.5}$ from the Proposed Action in combination with background concentrations, would exceed the NAAQS and NVAAQS as previously discussed. However, these maximum impacts would occur immediately adjacent to the air dispersion analysis ambient air boundary and would be minimized to concentrations in compliance with the NAAQS and NVAAQS within 1 mile or less.

Although there are several cumulative actions with the potential to be constructed simultaneously with the Proposed Action, based on the location information of these actions provided by the BLM, these actions would occur at a distance of 9 or more miles from the planning area. Similar to the particulate concentration impacts from the Proposed Action, high particulate concentrations from the cumulative actions would also be limited to the immediate vicinity of those projects' construction, with high concentrations dispersing rapidly with distance. The cumulative impacts due to construction would also depend on how many of the proposed projects would be constructed simultaneous with the Proposed Action. Additionally, each cumulative project would undergo its own environmental review and impact evaluation process which would likely include implementation of dust-control measures to mitigate air quality impacts.

The Proposed Action and other renewable energy projects would displace air emissions (criteria pollutant and GHGs) that would otherwise be released from fossil fuel power plants. Other cumulative actions such as transportation related and transmission line ROWs, would not be expected to have substantial cumulative effects on regional air quality, with potential adverse impacts occurring only during construction of the various projects.

Alternative B. Soils and Vegetation Conservation Alternative

Cumulative effects on air quality from Alternative B would be the same as those described under the Proposed Action, with less potential to be adverse for particulate emissions; this is due to the reduction in the potential for generation of fugitive dust from soil disturbances and engine exhaust from heavy equipment used to perform vegetation removal and grading. Cumulative impacts related to GHG emissions would also be less than those described under the Proposed Action.

Alternative C. No Action Alternative

No air emissions nor exceedances of NAAQS and NVAAQS would occur and there would be no adverse effects in the planning area.

4.3 BIOLOGICAL RESOURCES

4.3.1 Vegetation, including Noxious Weeds; Nonnative, Invasive Plants; and Special Status Plants

Analysis Methods and Assumptions

This section describes the potential impacts on biological resources from the Proposed Action and Alternative B. It assesses impacts in terms of their duration (short term or long term) and context (local or regional). A short-term impact is one that would occur during construction and decommissioning of the projects, while a long-term impact could occur for an extended period during operations of the projects.

Where appropriate, the analysis recommends avoidance, minimization, or mitigation measures to avoid, reduce, or otherwise offset impacts. These measures are summarized in the Biological Resources Supplemental Environmental Report (BLM 2024d) and included in **Appendix B**. These measures include:

- The design features for ecological resources identified in the Solar RMPA (BLM 2012)
- Additional unique programmatic design features that may be applicable to projects in the planning area (**Table B-1** in **Appendix B**)
- Potential BMPs for projects in the planning area (**Table B-2** in **Appendix B**)

Not all measures in **Appendix B** would be applicable to each individual project in the planning area. Rather, the appendix provides a list of measures that the BLM Authorized Officer could require as a condition of approval for a given project. Implementing these measures would avoid, reduce, or mitigate effects. The direct and indirect effects described below are those that could occur after implementing the measures, as applicable.

This analysis makes the following assumptions:

- Unless otherwise noted, the analyses below assume that each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario (see Appendix A of the Supplemental Information Report; BLM

2024b) and each project plan of development. Because this is a programmatic-level analysis, the precise location, size, and arrangement of facility components within each project area, and thus the total amount of acres of surface disturbance in each project area and the larger planning area, are estimates. Therefore, the analyses assume disturbance could occur anywhere within each project area in the short term, during and shortly following construction.

- Consistent with the above assumption, the total acres of Environmental Protection Agency Level IV ecoregion types, SWReGAP land cover types, US Department of Agriculture NRCS ecological sites, and habitats for general wildlife and special status species that would be disturbed are equal to the sum of these acres in each project area, representing effects within the larger planning area.
- Direct effects would occur in the individual project areas during construction, operation, and maintenance of the proposed facilities. Indirect effects could occur farther away from the project areas. The effect intensity would depend on the distance from the project areas and on receptor sensitivity.
- Interim reclamation would take place on the portions of cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. These areas would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible; they would be seeded with a BLM-approved seed mix.
- The precise fencing configuration that each solar development project would use is not known at this time. The analysis assumes that each solar development project would be fenced, and that the fences would be designed to allow continued public access on existing routes. Fencing would include typical chain-link fencing between 6 to 10 feet tall with barbed wire frequently installed at the top.
- Noxious weeds and nonnative, invasive plant species would continue to be introduced to the planning area as a result of human-caused and natural processes, including vehicle use on area highways; motorized recreational OHV use; and wind, water, and wildlife movements.

The analyses below use the following indicators:

- Acres of each SWReGAP land cover type and ecological site potentially affected (acres of surface disturbance)
- The potential for changes to the structure, composition, and function of native vegetation communities
- The potential for establishment and spread of noxious weeds and nonnative, invasive plant species
- The potential for changes to the distribution and extent of special status plant populations and seed banks
- The potential for actions to result in a need to list BLM sensitive plant species under the Endangered Species Act

Alternative A. Proposed Action

As stated in the analysis assumptions, any lands within each project area could be disturbed during construction; therefore, the ground surface could be disturbed, and vegetation could be removed from anywhere within each project area. The acres of SWReGAP land cover types[32] and US Department of Agriculture NRCS ecological sites that would be removed in each project area are therefore the same as the acres of land cover types and ecological sites that are currently present in each project area.

It is likely that as each project progresses through design phases, the actual amount of short-term surface disturbance would be lower. This is because portions of each project would likely be avoided due to resource or other constraints, including, but not limited to:

- Avoiding areas of sensitive vegetation, soils, or land cover, like the Big Smoky Valley playa lake, substantial dry washes, or desert pavements
- Avoiding habitat that is occupied or suspected to be occupied by special status plant or wildlife species
- Avoiding culturally sensitive areas, if they are present

Such areas would generally be avoided as a result of adhering to the design features identified in **Appendix B**, which would include conducting habitat assessments and surveys within the project areas to identify sensitive areas prior to construction of each project (see design features ER1-1, ER2-1, and those in *Other Programmatic Design Features* in **Table B-2** of **Appendix B**).

Constructing and maintaining solar facilities would directly remove vegetation in the construction footprint. This would remove acres of aboveground vegetation cover and biological soil crusts, if present (see **Section 4.15**, Soils), in each project area and change these areas to developed surfaces, like concrete, compacted gravel, or compacted soil; these do not support vegetation, or they only support limited, typically nonnative annual species adapted to disturbed conditions. Below the ground surface, these would alter soil nutrient distribution as well as mycorrhizal activity, potentially affecting the pace of future reclamation.

Vegetation removal may be accomplished by mowing or other methods that do not substantially disturb the ground surface, including potentially within the proposed solar arrays. Similarly, in areas with low-statured vegetation communities, and depending on the type of solar collector proposed for use, the need for vegetation removal in the solar array could be reduced because solar collectors could be placed over existing vegetation without first grading the ground surface. In such cases, complete vegetation removal would not occur. Instead, selective removal could occur, changing the vegetation community structure and composition. For example, shrubs and perennial grasses over a certain height could be mowed or removed using hand tools. In areas with exclusively low-statured vegetation, solar array installation could proceed without the need to first mow vegetation. In these cases, vegetation would be crushed by construction vehicles driving over the ground surface during the solar array installation. These methods would also affect the soil nutrient distribution and mycorrhizal activity, though to a lesser extent than grading.

Where arrays are installed over retained vegetation, the vegetation would likely shift to species that are able to persist in the altered environmental conditions under the array, including reduced solar radiation

[32] The Southwest Regional Gap Analysis Project (SWReGAP) was initiated in 1999 as a multi-institutional cooperative effort to map and assess biodiversity for a five-state region (Arizona, Colorado, Nevada, New Mexico, and Utah) comprising approximately 560,000 square miles in the southwestern U.S.

and altered moisture distribution during precipitation events. It is likely that the dominant species in such areas would shift to those adapted to disturbed conditions, including nonnative annual grasses and forbs.

Removing or altering the shrub canopy could also increase the potential for the release of both native perennial grasses and forbs (Monsen et al. 2004) and invasive annual grasses (Davies et al. 2011) if seed banks are present in the understory. These would change the vegetation community structure and composition. In the case of invasive annual grasses, the percent cover of invasive annual grasses would likely increase in disturbed areas and potentially in the adjacent, undisturbed vegetation communities. Managing invasive, nonnative plants in accordance with the BLM Battle Mountain District Integrated Weed Management Plan for the Mt. Lewis Field Office and Tonopah Field Office (BLM 2009a) would reduce this effect.

Ground disturbance and vegetation removal during construction would directly remove nesting habitat (for example, for ground-nesting bees) and nectar sources for native plant pollinators. Individual pollinators could also be crushed or injured during construction activities. Pollinators outside the disturbed area would experience reduced availability and cover of some nectar sources and potential nesting habitat. As a result, vegetation communities adjacent to the project areas could be subject to less visitation by pollinators, promoting higher rates of plant self-fertilization and inbreeding depression (Lennartsson 2002); this would lead to reduced functional diversity (Girão et al. 2007) and productivity of plant communities (IPBES 2016). In turn, this could cause lower resistance to nonnative, invasive plant invasion and less resilience to future disturbance.

Implementing design features (**Appendix B**) for fugitive dust control (see design feature ER1-1(b)), including watering work areas and placing gravel on access roads, would minimize, but not prevent, the potential that fugitive dust generated during construction would be deposited on vegetation around the construction areas. Depending on the severity of deposition, fugitive dust that settles on vegetation can reduce pollinator success and diminish plant productivity by impeding plant physiological processes. Dust that is mobilized by wind can also damage plants by exposing roots (wind erosion), burying them (deposition), and damaging their leaves and stems (abrasion), depending on the particle size, wind speed, and other conditions.

Design features for noxious weeds and nonnative, invasive plant species (see design features ER1-1(b), ER2-1(a), and ER3-1(a) in **Appendix B**) would minimize, but not prevent, the potential that ground disturbance and native vegetation community removal or modification during construction would increase noxious weeds and nonnative, invasive plant species' establishment and spread. Measures would include following the BLM Battle Mountain District Integrated Weed Management Plan for the Mt. Lewis Field Office and Tonopah Field Office (BLM 2009a). Measures, including equipment cleaning, using certified weed-free erosion-control materials, and monitoring for and treating weeds, would help minimize the establishment and spread of nonnative, invasive plant species in the project areas.

As part of noxious weed and nonnative, invasive plant species management during construction, operation, interim reclamation, and eventual decommissioning of the proposed projects, it is likely that chemical treatments would be used for control. The effects of chemical treatments on vegetation are described in detail in the Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (BLM 2007, pp. 4-44 to 4-76) and the 2016 Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States (BLM 2016, p. 4-25 to 4-38). Approval for herbicide use would follow procedures in the

BLM Battle Mountain District Integrated Weed Management Plan for the Mt. Lewis Field Office and Tonopah Field Office (BLM 2009a).

As described in those PEISs, chemical treatments can be used to remove target plants or to decrease target plant growth, seed production, and competitiveness, thereby releasing native or desirable species from competitive pressure and aiding in their reestablishment where vegetation modification is desired. Potential impacts on nontarget vegetation, as described in those PEISs, include death, reduced productivity, and abnormal growth from unintended contact with chemicals via drift, runoff, wind transport, or accidental spills and direct spraying. The degree of impacts depends on the chemical used and its properties, such as persistence, the application rate, the treatment method, the physical site conditions, and the weather (such as wind or rain) during treatments (BLM 2007, p. 4-47, *Impacts Common to All Treatments*). These effects would generally be limited to the short term during and immediately following treatments. Following the standard operating procedures (BLM 2007, Table 2-8) and mitigation measures (BLM 2016, Table 2-5) described in the PEISs would prevent impacts or reduce the impacts' intensity.

The effects of chemical treatments on pollinators would depend on the chemical used, treatment timing, and plant and pollinator species affected. As described in BLM 2007 (pp. 4-101 to 4-118) and BLM 2016 (pp. 4-39 to 4-41), some chemical formulations can be toxic to pollinators; acute or chronic exposure to these formulations could result in mortality and reduced population sizes, indirectly reducing ecosystem function. Some pollinators would benefit from treatments that remove nonnative species and indirectly increase native plant species' growth and cover. Following the standard operating procedures and mitigation measures described in the PEISs, such as using the lowest effective rates, applying application buffers, and preventing drift, would minimize or avoid these impacts. These measures are consistent with best practices for pollinators on western rangelands (Xerces 2018), such as using formulations that are least toxic to pollinators, using the lowest effective rates, timing applications to avoid pollinator exposure, incorporating application buffers, and preventing drift.

Interim reclamation would take place on portions of cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. Reclamation would help to decrease potential invasive, annual grass germination by providing competition in the form of desired perennial grasses and forbs, thus reducing available resources and growing space. To best meet project objectives, reclamation plant selection would be decided at the site level using guidance from BLM Handbook 1740-2. In accordance with the handbook (BLM 2008a, p. 87), the BLM would prioritize native plant material for revegetation. Nonnative plants could be used when the natural biological diversity would not be diminished by nonnative species, when nonnative species could be confined to the revegetated areas, when site inventory indicates a site would not support native species' reestablishment, or when resource objectives could not be met with native species.

During reclamation, the BLM would follow BLM IM 2016-013, Managing for Pollinators on Public Lands, which would require incorporating at least one pollinator-friendly, native plant species in projects that include seeding. This would reduce the loss of pollinator nectar sources in the project areas.

Alternative B. Soils and Vegetation Conservation Alternative

This alternative is similar to the Proposed Action because any of the lands within the project areas could be disturbed from construction, noise, vegetation removal and mowing, and human presence. However, under this alternative, surface disturbance would be less than it would be under the Proposed Action; this is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent would be mowed down to 18 to 24 inches tall. With this construction method, soils would be disturbed and compacted but left in place; also, the soil seed bank would be retained to facilitate the eventual recovery of 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; however, this habitat would be of lower quality due to the loss of perennial vegetation, the smaller stature of plants, and the reduced seed sources available on-site.

Indirect effects on vegetation would be expected to occur from construction activities both on-site 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.

Alternative C. No Action Alternative

Under Alternative C, the BLM would not amend the Tonopah RMP, in addition, future development could be constrained by the existing VRM classifications or slope requirements. Effects from construction on vegetation, including special status plant species, noxious weeds, and nonnative, invasive plant species would not occur at the levels or timeframes described under the Proposed Action. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation on existing roads, highway vehicle use, and road maintenance, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized nonnative, invasive plant establishment and spread, primarily along these routes.

Cumulative Effects Analysis

The CESA for vegetation, including invasive, nonnative species and special status plant species, is the 12-digit HUC sub-watersheds that overlap the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**).

The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Table 4-2 lists the reasonably foreseeable projects within the CESA for biological resources. Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, vegetation in the CESA are as follows: ROWs for energy transmission, energy generation, minerals exploration and development, and roadways. Construction, operation, and maintenance of most of these actions have removed, and would continue to remove, vegetation, disturb soils, increase the potential for weed establishment and spread, and degrade and fragment habitat in the CESA.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action and Alternative B would contribute to vegetation removal and surface disturbance, the potential for weed establishment and spread, and habitat loss and fragmentation. Implementing the design features and BMPs would minimize, but not completely avoid, the alternatives' contribution to the cumulative effects.

Construction of utility-scale solar energy projects could remove vegetation anywhere within the footprints of the facilities during land-clearing and land-grading operations. The primary potential impacts associated with these operations would be vegetation and wildlife habitat removal, soil disturbance that would increase the potential for invasive plant establishment and spread, and water- and wind-driven soil erosion. If site grading alters the surface drainage patterns, this could change the surface runoff and soil moisture characteristics in downstream dry wash communities and intermittently flooded playa areas, altering these habitats for vegetation and wildlife. A hydrologic analysis is provided in the Hydrologic Resources Supplemental Environmental Report (BLM 2024f).

Contributions to cumulative effects on special status species would be greater for those species that are less tolerant of fragmented or disturbed habitats. While some general wildlife can inhabit relatively disturbed habitats and reoccupy temporarily disturbed and restored areas relatively quickly, some special status species, including kangaroo mice, may not have this ability. Temporarily disturbed suitable habitat, even if restored, can take a relatively long time to regain suitability; also, restoration would not guarantee species' reoccupation.

Combined with past, present, and reasonably foreseeable future actions, the action alternatives would increase the presence of infrastructure in the CESA. The primary potential impacts associated with this would be an increased potential for wildlife injury or mortality due to strike, entrapment, or electrocution; however, the potential for these impacts would be reduced by incorporating design best practices for wildlife protection.

Under the No Action Alternative, surface disturbance, vegetation removal, and access restrictions would not occur; therefore, the No Action Alternative would not have a cumulative contribution on vegetation, including noxious weeds; invasive, nonnative species; and special status plant species.

4.3.2 Wildlife, including Threatened, Endangered, and Special Status Species

Analysis Methods and Assumptions

The wildlife, including special status wildlife, area of analysis is the planning area plus a 2-mile buffer around the area. As described in the assumptions below, this is the distance that would be needed for construction noise to attenuate to the baseline ambient level.

The wildlife, including special status wildlife, analysis uses the following indicators:

- The potential for actions to result in a loss of individuals or populations, or loss, degradation, or modification of habitats
- The potential for actions to disturb individuals or disrupt natural history processes like breeding, foraging, or migration
- The potential for actions to result in a need to list BLM sensitive wildlife species under the Endangered Species Act

The wildlife analysis used the following assumptions:

- A short-term impact is one that occurs during implementation of the Proposed Action or action alternatives and for up to 10 years after implementation, while a long-term impact could occur for an extended period after implementation of the Proposed Action or action alternatives.
- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario and each project plan

of development. The precise location and arrangement of facility components within each project area, and thus the total amount of acres of surface disturbance in each project area, are estimates. Therefore, the analyses assume that anywhere within each project area could be disturbed in the short term, during and shortly after construction. Interim reclamation would take place on the portions of cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. These areas would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible; they would be seeded with a BLM-approved seed mix.

- The primary noise generator associated with the Proposed Action and alternatives would be construction, including the use of typical construction heavy equipment. **Table 4-5**, below, lists example noise levels from typical construction equipment. Of the example equipment listed, impact and vibratory pile drivers and impact hammers would be expected to be the loudest pieces of equipment, if they are used during construction. The use of certain equipment during project O&M would also generate noise; however, in most cases, noise would not reach levels associated with the construction phase. Blasting is assumed not to be used during construction.

  Noise from stationary sources lessens at a rate of approximately 6 dBA per doubling of distance. Noise receptors occurring 1 to 2 miles outside the project areas (approximately 5,300–10,500 feet away) would likely experience noise levels that are comparable with current ambient noise conditions. As such, the analysis area for noise effects is the project areas plus a 2-mile buffer around these areas. The effect intensity would depend on the distance from each project area and on the receptor's sensitivity.
- Noxious weeds and nonnative, invasive plant species would continue to be introduced to the planning area as a result of human-caused and natural processes, including vehicle use on area highways; motorized recreational OHV use; and wind, water, and wildlife movements.

Table 4-5. Example Construction Equipment Noise Levels

Example Equipment[1]	Impact Device?	Typical Noise Level (dBA) at 50 Feet from the Source
Auger drill rig	No	85
Backhoe	No	80
Compactor (ground)	No	80
Compressor (air)	No	80
Concrete mixer truck	No	85
Concrete pump truck	No	82
Crane	No	85
Dozer	No	85
Drill rig truck	No	84
Dump truck	No	84
Excavator	No	85
Flatbed truck	No	84
Front-end loader	No	80
Generator	No	82
Grader	No	85
Impact pile driver	Yes	95
Jackhammer	Yes	85
Mounted impact hammer (hoe ram)	Yes	90

Example Equipment[1]	Impact Device?	Typical Noise Level (dBA) at 50 Feet from the Source
Pickup truck	No	55
Vibratory pile driver	No	95

Source: FHWA 2006
[1] Blasting is not anticipated to be necessary

Alternative A. Proposed Action

The potential types of impacts on wildlife species from the construction, operation, maintenance, and eventual decommissioning of solar energy facilities would include direct (disturbance, injury, or mortality) and indirect (habitat loss, fragmentation, and modification) impacts. Under the Proposed Action, any lands within each project area could be disturbed; thus, wildlife habitat in the project areas would be disturbed, with exceptions in areas where there is naturally barren habitat. This would contribute to habitat loss, alteration, and fragmentation. The acres of habitat that would be removed in each project area are the same as the acres of land cover types and ecological sites that are currently present in each project area.

The installation of fencing may be used during various stages of construction, operation, maintenance, and decommissioning of the solar facilities. To prevent use by wildlife, additional fencing may be used, such as surrounding revegetation efforts or around evaporation ponds where water quality may harm wildlife (see design feature ER2-1 in **Appendix B**). Site fencing would cause some ground disturbance from pounding posts into the soil, which could impact the integrity of the soil and surrounding vegetation; however, this would be minimal and short term. Installation of fencing could also cause short-term displacement of individuals during the installation process due to human presence. Noise disturbance associated with the fence installation could disturb migratory birds' breeding activities. Also, workers could cause accidental damage to nests and eggs on the ground or in vegetation near the ground. To mitigate these effects, fence installation would not occur during the breeding or nesting season for migratory birds, which typically occurs between March 1 and August 31. Additionally, the BLM would conduct surveys to ensure proper avoidance of any active nests prior to work.

In addition to habitat fragmentation and the attendant obstacles to gene flow within and across wildlife populations, increased noise, electromagnetic field production, microclimate disruption, pollution, water use, and an increased potential for human-caused fire are all possible impacts of facility O&M (Lovich and Ennen 2011). This habitat loss and disturbance could lead to reduced breeding success for individuals that are displaced into surrounding areas as well as those affected by the fragmentation of the planning area's overall footprint. These, in turn, could affect distribution of large mammals, such as big game, and raptors that forage on rodents, small mammals, and lizards.

Surface disturbance under this alternative could result in potential mortality from destruction of underground burrows for reptiles and small mammals that forage or have burrow complexes within the work areas. Limiting vehicle and equipment travel to established roads and roads that are part of the Proposed Action would reduce the potential for burrow damage. Speed limits for construction and operational traffic would minimize, but not avoid, potential wildlife injury or mortality from vehicle strike.

The presence of construction workers, equipment, and noise could cause animals to avoid the area during construction activities. Larger species, such as big game, could be displaced or disturbed by construction noise or human presence during construction. These impacts are expected to be short term and would affect individuals and local groups of animals using or migrating through the area during construction. Indirect, short-term effects on most wildlife species would typically come from increased noise, human presence, and heavy equipment present during construction activities.

Depending on the noise intensity and duration, human-caused noise can result in wildlife changes in habitat use, changes in foraging behavior, increased stress, weakened immune systems, reduced reproductive success, increased predation risk, disrupted communication or masked communication, and hearing damage (Blickley and Patricelli 2010; Lovich and Ennen 2011). Brief, loud noises are more likely to be perceived as predatory sounds, which may elicit an artificial fight-or-flight response. Most human-caused noise sources have energy concentrated in low frequencies that travel longer distances with relatively low energy expense (Blickley and Patricelli 2010). At these frequencies, wildlife communication may be more affected than other behaviors, which may be impacted by noises at other frequencies.

Most anticipated noise is associated with equipment and vehicle use during construction, and the noise intensity would be as described in **Table 4-5**, Example Construction Equipment Noise Levels. However, noise can also be generated from ongoing project maintenance and operation (Lovich and Ennen 2011), which would be a long-term effect on wildlife. For example, noise produced from vehicles using roads to access the projects, as well as for short-term maintenance activities, also would emit noise and could affect wildlife behavior similar to that described above.

Construction could also result in disturbance to, or injury or mortality of, migratory birds and raptors protected under the Migratory Bird Treaty Act. Generally, it is illegal to harm individual migrating birds or to destroy active nests without proper authorization. Because of this, ground-disturbing operations are strictly discouraged in central Nevada during the bird-nesting season, which is normally from April 1 to August 31. Nest surveys should be conducted prior to ground disturbance if activities must take place during that season; if active nests are found, buffer zones should be established where activities may not occur until the nest ceases to be active. Depending on the species, the buffers may vary in size.

Activities, including site preparation, vegetation clearing, and grading, could injure or kill birds or destroy nests, eggs, or young, particularly those species that nest in shrubs or on the ground. To avoid direct mortality, preconstruction avian surveys would be conducted if construction activities must occur during the nesting season. If active nests are present within the areas to be disturbed, measures may include avoidance buffers until the nest is no longer active.

Indirect, short-term effects from noise, as described above, could lead to reduced breeding and nesting success for individuals within or near the project footprint. This, in turn, could affect foraging opportunities for species that prey on adult birds, nestlings, or eggs. Raptor species that prey on small mammals, rodents, and lizards could avoid foraging within or adjacent to the project footprint during construction activities.

Utility-scale solar projects have the potential to attract bird species that may mistake the solar array for a body of water, causing them to land on or collide with the arrays and suffer injuries or mortality. This phenomenon is called a "lake effect." Waterbirds are particularly at risk since many species of waterbirds require water takeoffs and landings. Once they land on the desert floor, often they become stranded and perish (Kosciuch et al. 2020).

Vegetation damage from dust abrasion could eventually result in a reduction in the primary output of the plants. This could have an indirect impact on the quality of the habitat and the food sources for wildlife (Lovich and Ennen 2011).

Microclimate effects also would occur when the vegetation from the landscape has been removed to build solar arrays. Potential impacts on vegetation during operations of a PV facility would include a lack of precipitation reaching the soil and shading under the solar arrays; however, a reduction in solar radiation under the panels can lead to lower temperatures and higher soil moisture (Graham 2021). Plants that are more shade tolerant could increase, while plants that require more sun could decrease. The delay in bloom time of native plants due to shading underneath solar arrays could benefit late-season pollinators (Graham 2021).

Construction would increase the risk of pollution (from spills and leaks) and the potential for human-caused fire. Both would have the potential to degrade wildlife habitat. Project applicants would be required to adhere to environmental plans during construction, operation, maintenance, and decommissioning, such as spill prevention and control plans and fire prevention and response plans. This would reduce the potential for these effects.

Special Status Wildlife Species

Generally, the types of effects described above for general wildlife would also apply to special status wildlife. However, since special status wildlife tend to have smaller ranges, distributions, and populations, and more specialized habitat requirements than general wildlife, the effects may be more intense. Species-specific impacts are described below.

Special Status Reptiles

A number of special status reptiles have been documented in the planning area. Alteration or loss of xeric, rocky communities with sagebrush and salt desert scrub vegetation communities would be a loss of habitat for these species. This analysis assumes that any of the lands within each project area could be developed, and these species could potentially use the entirety of habitats within the planning area. As a result, habitat for special status reptiles would be lost within the footprint of each project area.

Special Status Birds

Several BLM sensitive bird species have been detected in or have the potential to use habitats in the project areas. These include the Brewer's sparrow, the western burrowing owl, and the loggerhead shrike, among others. The burrowing owl may be of particular concern because of the species' range-wide population decline, because they utilize other species' burrows, and because they are more significantly impacted by the loss of these resources. During preconstruction, species-specific surveys would be conducted to determine the distribution of occupied habitats, nests, or burrows in the project areas. If occupied habitat is detected, avoidance measures would be developed to avoid or minimize effects. Measures could include spatial or temporal nest or burrow avoidance, or both, and would be determined in coordination with the BLM Authorized Officer.

The Bald and Golden Eagle Protection Act provides protection for bald and golden eagles in addition to the Migratory Bird Treaty Act provisions. The area surrounding the planning area does not support bald eagles; however, golden eagles nest in the rocky outcrops and cliffs close to the planning area, and habitats within and surrounding the planning area support small mammals and other species that provide a prey base to support golden eagles. Avoidance measures would be developed to avoid take of golden eagles during project construction; these measures would be documented in an avian protection plan developed in coordination with the USFWS, NDOW, and BLM. Measures could include surveys to determine the distribution of nests and their distance to the Proposed Action. Measures would be developed to avoid or minimize effects; these measures could include spatial or temporal nest avoidance, nest monitoring during construction, or both.

The USFWS recently published a final rule "Permits for Incidental Take of Eagles and Eagle Nests" (89 *Federal Register* 9920) which became effective on April 12, 2024. The rulemaking adopts two regulations for administering permitting: specific permits (50 CFR 22.200) and general permits (50 CFR 22.210), including activity-specific eligibility criteria and permit requirements for four types of eagle take, including incidental take permitting for power lines and disturbance take. If eagle take cannot be avoided during construction, the appropriate type of permit would be obtained prior to activities causing take.

The greater sage-grouse bistate White Mountains population management unit overlaps portions of four project areas in the planning area. Suitable habitat for the sage-grouse bistate population is likely limited in the planning area given the lack of sagebrush vegetation, but it is possible that bistate sage-grouse may use portions of the planning area. While unlikely, impacts on bistate sage-grouse from construction, operations, maintenance, and eventual decommissioning could include direct and indirect impacts. These impacts include habitat loss, degradation, and fragmentation, and noise and visual disturbances. Vegetation clearing would remove or modify habitat, and sage-grouse could also be injured or killed from collisions with vehicles.

Indirect impacts associated with noise and human activity, including waste, food items, and transported water resources for construction activities, would extend farther than the actual disturbance footprint. Anthropogenic resources may also attract predators to the area, resulting in increased predation. The Proposed Action would include measures to avoid or minimize effects on bistate sage-grouse during construction and operation, as outlined in **Section B.2.6**, Other Best Management Practices in **Appendix B**. These include, but are not limited to, seasonally and spatially limiting potentially disturbing activities near habitat, minimizing predator nesting substrate, and reducing impacts from new fence construction.

Nest depredation is the most common reason greater sage-grouse nests fail, and one of the main nest predators is the common raven. Although ravens naturally occur in almost every habitat type in North America, human presence has enabled raven populations to increase exponentially in areas where they did not previously occur. Ravens and other corvids are highly intelligent and have been known to solve complex problems and use tools. They are generalists and opportunistic foragers; they take advantage of human-caused food sources in rural environments, such as roadkill, landfills and trash containers, gut piles associated with hunting, water troughs for livestock, and carrions (Howe et al. 2014). Tall structures, such as transmission lines, provide perching and nesting opportunities in sagebrush ecosystems. By increasing the number of ravens in the area, resource subsidies, such as those listed previously, can increase the predation pressure on greater sage-grouse by ravens. Howe et al. (2014) found ravens were most likely to nest near edges of adjoining big sagebrush and land cover types that were associated with direct human disturbance or fire.

In summary, sage-grouse would likely be extirpated from the project vicinity (in the instance that they are present in the area) due to the loss of important food resources and refuge from predation, and the increased human presence and disturbance. However, because there is no proposed critical habitat for the bistate population of greater sage-grouse in the planning area vicinity, the Proposed Action would have no effect on critical habitat. Additionally, there is no suitable habitat for the southwestern willow flycatcher in the planning area (see Appendix B of the Biological Resources Supplemental Environmental Report [BLM 2024d]); therefore, the Proposed Action would not affect critical habitat for either species.

Special Status Mammals

The planning area may provide general foraging habitat. However, suitable roost locations for bat species are likely not found within the planning area; this is due to a lack of mature trees, cliffs, and outcrops. Construction noise and activities could disturb roosting bats if they are adjacent to the planning area in the nearby ranges. Prior to project construction, a bat protection plan would be developed in coordination with the USFWS, NDOW, and BLM. The plan would describe measures to reduce the potential of injury or mortality to bats from project construction and operation, to ensure adequate monitoring is in place to determine whether mortalities are occurring, and to provide a mechanism to implement adaptive management, as needed, to reduce injury or mortality.

Pale kangaroo mouse has been documented to occur in portions of the planning area, and dark kangaroo mouse may also occur there. Surveys to determine the distribution of these species would be conducted in all suitable habitats in the planning area. In occupied habitat, avoidance and minimization measures would be developed in coordination with the NDOW and the BLM Authorized Officer to avoid or minimize effects on these species. Measures could include spatial avoidance of occupied or high-quality habitat. Even with measures in place, residual effects could include injury or mortality of dispersing mice from road traffic. Construction crew traffic would increase the probability of running over a kangaroo mouse, especially if vehicles are used at night; however, vehicle collisions would be reduced by project speed limits and construction hours. Short-term disturbance, habitat avoidance, or noise masking due to construction noise would also be possible.

Construction noise and human presence could displace bighorn sheep from their occupied distribution (70 acres) in the Red Ridge 1 Solar project area. Compared with the amount of occupied distribution in the Silver Peak Range, the amount of occupied distribution in this project area is small. Further, this effect would be short term, only occurring during construction. Therefore, effects on bighorn sheep are anticipated to be minor overall.

Special Status Invertebrates

Removal of milkweed species during construction would reduce the amount of larval nectaring habitat available for monarch butterflies in the planning area. To reduce the intensity of this effect, the BLM would include milkweed seeds as a part of the authorized seed mix to use in interim and final reclamation activities. Removal of saltgrass vegetation near the Big Smoky Valley playa could reduce potentially suitable habitat for the Big Smoky wood nymph; if such habitat is occupied, this could also result in direct injury or mortality of larvae or adults. To avoid or reduce the intensity of this effect, such habitats would be preserved, including a buffer around the habitats, during construction of projects surrounding the Big Smoky Valley playa.

Alternative B. Soils and Vegetation Conservation Alternative

This alternative is similar to the Proposed Action because lands anywhere within the project areas could be disturbed from construction, noise, vegetation removal and mowing, and human presence. However, under this alternative, surface disturbance would be less than it would be under the Proposed Action; this is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent would be mowed down to 18 to 24 inches tall, keeping plant ecosystems intact, or partially intact. This would allow for partial habitat use by wildlife, particularly insects and pollinators, small mammals, birds, and reptiles.

With this construction method, soils would be disturbed and compacted, but they would be left in place. Similarly, by leaving plant roots intact, soil erosion from wind would be reduced. Also, the soil seed bank would be retained to facilitate the eventual recovery of vegetation. This would reduce the cost of restoration efforts in the long run because the native plant base would already be in place, rather than establishing a plant base through reseeding and planting plugs, especially if soils were lost to wind erosion. Plants that continue to grow within the solar field would be expected to provide various types of habitat function, such as forage and shelter; however, this habitat would be of lower quality due to the loss of perennial vegetation, the smaller stature of plants, and the reduced seed sources available on-site.

Indirect effects on vegetation would be expected to occur from construction activities both on-site 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. Like under the Proposed Action, construction under Alternative B 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.

Ground disturbance and vegetation removal or trimming could result in direct, adverse effects on 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. 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.

Alternative C. No Action Alternative

Under Alternative No Action Alternative, the BLM would not amend the Tonopah RMP, in addition, future development could be constrained by the existing VRM classifications or slope requirements. Surface disturbance from construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no changes in existing wildlife habitat conditions from construction. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation on existing roads, highway vehicle use, and road maintenance, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized nonnative, invasive plant establishment and spread, primarily along these routes. These would also result in periodic disturbance to wildlife species.

Cumulative Effects Analysis

The CESA for wildlife, including special status wildlife species, is the 12-digit HUC sub-watersheds that overlap the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Table 4-2 lists the reasonably foreseeable projects within the CESA for biological resources. Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, vegetation and wildlife in the CESA are as follows: ROWs for energy transmission, energy generation, minerals exploration and development, and roadways. Construction, operation, and maintenance of most of these actions have removed, and would continue to remove, vegetation, disturb soils, increase the potential for weed establishment and spread, degrade and fragment habitat, and disturb wildlife in the CESA.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action and Alternative B would both contribute to vegetation removal and surface disturbance, the potential for weed establishment and spread, habitat loss and fragmentation, and wildlife disturbance due to construction and noise, as described below. Implementing the required design features and avoidance, minimization, or mitigation measures identified in Appendix C of the Biological Resources Supplemental Environmental Report (BLM 2024d) would minimize, but not completely avoid, the alternatives' contribution to the cumulative effects.

Construction of utility-scale solar energy projects would remove vegetation anywhere within the footprints of the facilities during land-clearing and land-grading operations under the Proposed Action, and partially remove vegetation and move the remaining vegetation under Alternative B. The primary potential impacts associated with these operations would be temporary and permanent vegetation and wildlife habitat removal, soil disturbance that would increase the potential for invasive plant establishment and spread, and water- and wind-driven soil erosion. Altering the surface drainage patterns or hydrology could change the volume or timing of surface runoff and soil moisture in downstream dry wash communities and intermittently flooded playa areas.

Noise would be temporarily generated from constructing and maintaining the proposed infrastructure. Noise generated would affect wildlife such as from disturbance and displacement from habitat.

Contributions to cumulative effects on special status species would be greater for those species that are less tolerant of fragmented or disturbed habitats. While some general wildlife can inhabit relatively disturbed habitats and reoccupy temporarily disturbed and restored areas relatively quickly, some special status species, including kangaroo mice, may not have this ability. Temporarily disturbed suitable habitat, even if restored, can take a relatively long time to regain suitability; also, restoration would not guarantee species' reoccupation.

Combined with past, present, and reasonably foreseeable future actions, the action alternatives would increase the presence of infrastructure in the analysis area. The primary potential impacts associated with this would be an increased potential for wildlife injury or mortality due to strike, entrapment, or electrocution; however, the potential for these impacts would be reduced by incorporating design best practices for wildlife protection.

Under the No Action Alternative, surface disturbance, vegetation removal, and access restrictions would not occur; therefore, the No Action Alternative would not have a cumulative contribution to effects on wildlife, including special status wildlife.

4.4 Forestry

4.4.1 Analysis Methods and Assumptions

The forestry area of analysis is the planning area.

The forestry analysis uses the following indicator: the potential for changes in forest product availability.

The forestry analysis used the following assumptions:

- A short-term impact is one that occurs during implementation of the Proposed Action or action alternatives for up to 10 years after implementation, while a long-term impact could occur for an extended period after implementation of the Proposed Action or action alternatives.
- The planning area lacks the vegetation communities that would support forest product harvest or collection of fuelwood, greenwood, fence posts, pine nuts, or Christmas trees; therefore, there would be no change in the availability of forest product harvest or collection of these products.
- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario (see Appendix A of the Supplemental Information Report; BLM 2024b) and each project plan of development. The precise location and arrangement of facility components within each project area, and thus the total amount of acres of surface disturbance in each project area, are estimates. Therefore, the analyses assume that any lands within each project area could be disturbed in the short term, during and shortly after construction. Interim reclamation would take place on the portions of cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. These areas would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible; they would be seeded with a BLM-approved seed mix.
- The entirety of each project area, as identified in the reasonably foreseeable development scenario and each project plan of development, would become unavailable for harvest or collection of forest products following project implementation. This is because access to the project areas would be restricted.

4.4.2 Alternative A. Proposed Action

As stated in the analysis assumptions, any lands within each project area could be disturbed during construction; therefore, the ground surface would be disturbed, and vegetation would be removed from anywhere within each project area. Construction would change these areas to developed surfaces, like concrete, compacted gravel, or compacted soil, that do not support vegetation, or that only support limited, typically nonnative annual species adapted to disturbed conditions. As a result, the entirety of each project area would cease to be suitable for collecting native seeds and cacti.

It is likely that as each project progresses through design phases, the actual amount of surface disturbance would be lower than the entirety of the project area. This is because portions of each project would likely be avoided due to resource or other constraints. Still, lands throughout each project area would cease to be available for native seed and cactus collection because access to the project areas would be restricted.

Prior to implementation of each project, cactus species in each project area would be available for collection.

4.4.3 Alternative B. Soils and Vegetation Conservation Alternative

Alternative B would have similar effects on the availability of native seeds and cacti for collection as the Proposed Action, as a result of disturbance during construction and restricted access to developed areas.

However, under Alternative B, surface disturbance and vegetation removal would be less than under the Proposed Action; this is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent of vegetation would be mowed to 18 to 24 inches tall. As a result, there would be less removal of native seeds and cacti for collection during construction. However, since access to developed areas would still be restricted, these harvest opportunities would become unavailable.

4.4.4 Alternative C. No Action Alternative

Under Alternative C, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. Until additional analysis is completed, and projects are approved, native seeds and cacti would continue to be available for permitted harvest and collection activities following procedures outlined in the 1997 Tonopah RMP and ROD (BLM 1997, p. 12) and BLM IM 2013-176, Seed Collection Policy and Pricing.

4.4.5 Cumulative Effects Analysis

The CESA for forestry is the 12-digit HUC sub-watersheds that overlap the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the cumulative effects analysis for forestry is the lifetime of the solar ROW leases and ROW grant (generally, 50 to 60 years).

Table 4-2 lists the reasonably foreseeable projects within the CESA for forestry. Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, forestry and forest product availability in the CESA are as follows: ROWs for energy transmission, energy generation, minerals exploration and development, and roadways. Construction, operation, and maintenance of most of these actions have removed, and would continue to remove, vegetation, disturb soils, and increase the potential for weed establishment and spread in the CESA. These would generally reduce the suitability of these areas for native seed and cactus collection.

Actions that reduce the extent or density of pinyon-juniper woodland vegetation communities have reduced the available opportunities for other forms of forest product harvest, including fuelwood, greenwood, fence posts, pine nuts, or Christmas trees. Woodland removal has been carried out for fuels treatment projects, ROW development and maintenance, mineral extraction, and other forms of development in the CESA. Actions that result in access restrictions also have reduced opportunities for harvest and collection.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action and Alternative B would both contribute to native vegetation community removal, surface disturbance, and access restrictions, which would further remove opportunities to collect native seeds and cacti.

Because the planning area lacks the vegetation communities that would support forest product harvest or collection of fuelwood, greenwood, fence posts, pine nuts, or Christmas trees, the action alternatives would not have a cumulative contribution to the potential opportunities for harvest and collection of these products.

Under the No Action Alternative, surface disturbance, vegetation removal, and access restrictions would not occur; therefore, the No Action Alternative would not have a cumulative contribution on the potential opportunities to harvest and collect native seeds, cactus species, or other forest products.

4.5 CULTURAL RESOURCES

Cultural resources are defined as physical manifestations (human-made and natural physical features) associated with past or present cultures that are, in most cases, finite, unique, fragile, and nonrenewable. These resources include precontact and historic-era archaeological sites, historic buildings and structures (architectural resources), and locations of important historic events. Cultural resources may also refer to places of traditional religious and cultural importance, including archaeological sites, landscapes, natural landforms, and small, discrete use areas that are important to the practice and continuity of traditional practices or necessary for maintaining a community's cultural identity. Cultural resources that are listed or eligible for listing on the NRHP are called "historic properties."

This section describes the potential effects on cultural resources from the Proposed Action and alternatives.

Under NEPA, the BLM must account for the potential impact of a major federal action on resources, including cultural resources. In addition to the stipulations under NEPA, Section 106 of the NHPA, as amended, and its implementing guidelines (36 CFR 800) require the BLM to identify any historic properties that might be affected by the proposed project. Following identification, the BLM must consider the effect of its undertakings on historic properties listed, or eligible for listing, on the NRHP, and to afford the Advisory Council on Historic Preservation an opportunity to comment.

Consultation with relevant stakeholders, including State Historic Preservation Officers (SHPOs), Tribal Historic Preservation Officers and Native American tribes, is then undertaken to gather input and address concerns. If adverse effects on historic properties are identified, the BLM would collaborate with stakeholders to develop measures to mitigate these impacts, such as altering project designs or implementing mitigation measures. The outcomes of these consultations are documented in legally binding agreements (typically memoranda of agreement or programmatic agreements). Finally, the BLM would implement the agreed-upon measures and monitor compliance with the terms outlined in the agreement(s) to ensure the project proceeds in accordance with Section 106 requirements.

NEPA and the NHPA are two separate laws with independent statutory requirements for federal agencies. However, the regulations for implementing NEPA (40 CFR 1500–1508) encourage integration of other mandated reviews, such as Section 106. Likewise, the regulations for implementing Section 106 of the NHPA (36 CFR 800.8) encourage agencies to coordinate Section 106 with the NEPA process.

As stated previously, this PEIS/RMPA and ROD will not approve any individual ROW grants. Rather, a site-specific analysis for individual projects would be conducted through subsequent tiered NEPA documentation. The individual studies summarized below and in the Cultural Resources Supplemental Environmental Report (BLM 2024e) are Section 106 studies; they comply within the regulatory context of the NHPA. The results of those studies inform the review documented in this PEIS/RMPA, which satisfies the requirements for review under NEPA until further consultation occurs during the project-specific NEPA analyses.

4.5.1 Analysis Methods and Assumptions

As defined under 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 cultural resources that are listed on or eligible for listing on the NRHP, as defined under 36 CFR 800.5(a)(1) (Criteria of Adverse Effect). Such resources are also known as historic properties. The BLM, as the lead federal agency for Section 106 compliance, will define the APE in consultation with the Nevada SHPO, Indian tribes, and other consulting parties during the project-specific NEPA analyses. The APE considers potential physical (direct) and visual, atmospheric, or audible effects on historic properties from the construction, operation, maintenance, and decommissioning of the proposed projects.

The analysis area for the cultural resources study area analyzed in this PEIS/RMPA is defined as a 5-mile area extending from the planning area. This area was identified as the preliminary study area for SHPO consultation; the APEs will be identified and consulted on for each application during the project-specific NEPA analyses. The analysis area coincides with the study area defined for the viewshed, within which project facilities would be most visible relative to cultural resources. This analysis area accounts for potential physical; visual, atmospheric, or audible; and cumulative impacts from implementation of the Proposed Action or alternatives that could result in adverse effects on historic properties.

The following describes the existing conditions for cultural resources and the considerations that the BLM will consider in the project-specific analyses of each application during the Section 106 process. Impacts on cultural resources can result in direct, indirect, and cumulative adverse effects on historic properties due to construction, operation, maintenance, and decommissioning of the projects or potential future implementation of a footprint. As defined in the Cultural Resources Supplemental Environmental Report (BLM 2024e), the methodology for evaluating the environmental consequences for analyzing effects is applicable to the analysis of the planning area.

As defined under 36 CFR 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 the property for the NRHP. An adverse effect on a historic property is not limited to physical destruction or damage; it may also include relocation of the property, changes in the character of the property's setting, 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 (that is, cumulative impacts). The BLM must determine whether the alteration of character-defining features of a historic property result in diminished aspects of integrity (that is, location, design, setting, materials, workmanship, feeling, and association [NPS 1995]) 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 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. Resources that are listed on or eligible for listing on the NRHP can be susceptible to degradation of their historic setting through alterations to the surrounding landscape. Specifically, properties that qualify for listing on the NRHP under

Criteria A, B, or C are eligible for listing due to associative values, including their association with significant events in the past, important people, or unique design characteristics. Historic properties that qualify for NRHP listing under any of these three criteria typically demonstrate an important relationship with the surrounding environment and 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 a proposed project would cause a visual intrusion sufficient enough to diminish the characteristics of the setting that make the property eligible. Where the setting does not contribute to the eligibility of the property, the effects on that setting are not important considerations. Historic properties that are only important for their information potential (that is, those that qualify under Criterion D) are not eligible for their setting and therefore are not directly affected by visual impacts. They may, however, still be adversely affected (as defined under Section 106) by direct impacts if they are in areas where ground disturbance occurs. Therefore, historic properties within the physical and visual study areas that qualify under Criteria A, B, or C are analyzed for visual effects.

Programmatic design features from the Solar RMPA (BLM 2012), which are outlined in **Appendix B**, are required for all solar development as applicable for each project. In addition, the 1997 Tonopah RMP and ROD (BLM 1997) specify the following mitigation measures, which would be implemented to minimize adverse impacts on cultural resources:

MM CR-1: Eligible Historic Property Treatment Options

The Section 106 consultation process and concurrence regarding the level of effect and treatment of the eligible historic property that is located within the Proposed Action development area is ongoing.

MM CR-2: Cultural Resources Management and Mitigation Plan

Prior to construction, the BLM-approved CRMMP developed and implemented by an archaeologist who meets the Secretary of the Interior's standards will include the following details:

- **Cultural Resource Training.** Prior to ground-disturbing activities, the applicant will retain a BLM-qualified archaeologist, defined as one meeting the Secretary of the Interior's qualification standards for archaeology and subject to approval by the BLM, to conduct cultural resources sensitivity training for all construction personnel. Construction personnel will be informed of the avoidance areas for eligible archaeological sites, the importance of remaining only within the designated project site development areas, the types of cultural resources that may be encountered, and the proper procedures to be enacted in the event of an inadvertent discovery of archaeological resources, including consequences for vandalism or theft. The applicant will ensure that construction personnel are made available for and attend the training and will retain documentation demonstrating attendance.
- **Cultural Resource Discovery.** The CRMMP will detail procedures for halting construction; making appropriate notifications to agencies, officials, and tribes; and assessing NRHP eligibility if previously unknown cultural resources are discovered during construction. The CRMMP will require that the contractor immediately cease all work activities in the area (within a minimum of 100 feet) of the discovery until a BLM-qualified archaeologist can evaluate it. After cessation of excavation, the contractor will immediately contact the BLM archaeologist. The contractor will

not resume work until authorization from the BLM is received. If the qualified archaeologist, in consultation with the BLM, determines that the discovery constitutes a historic property per Section 106 of the NHPA, preservation in place will be the preferred manner of mitigation. In the event preservation in place is demonstrated to be infeasible, the data recovery and preservation procedures outlined in the CRMMP will be followed.

MM CR-3: Discovery of Human Remains

If human remains or associated cultural items as defined by the Native American Graves Protection and Repatriation Act are discovered during construction, all work shall be halted in the area of the discovery and the BLM Authorized Officer shall be informed immediately. The BLM shall ensure that any Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony discovered on BLM-administered lands during implementation of the project shall be treated as unanticipated discoveries in accordance with the requirements of the Native American Graves Protection and Repatriation Act (Public Law 101-601) and 43 CFR 10. The preferred protection strategy shall be project redesign to avoid and protect inadvertent discoveries that contain human remains.

4.5.2 Alternative A. Proposed Action

Construction

Physical Effects on Known Resources

As specified in the Cultural Resources Supplemental Environmental Report (BLM 2024e), ground-disturbing construction activities have the potential to adversely affect 44 precontact sites in the study area that are eligible under Criterion D for listing on the NRHP. Prior to construction, the BLM would seek concurrence from the SHPO through the Section 106 process regarding the BLM's determination of eligibility and concurrence that the project would have adverse effects on the cultural resources.

Three historic-era sites that are determined eligible for listing on the NRHP under Criteria A and D by the BLM, with SHPO concurrence pending, are in the study area. Two of the historic-era sites are railroads, the Silver Peak Railroad (26ES428/26ES1317) and the Tonopah and Goldfield Railroad (26ES444), that are found within the study area and extend outside the planning area. The other historic-era site is a habitation location (GD-305). The historic-era habitation site, which is preliminarily listed under Criteria A and D, is pending SHPO concurrence.

There are 367 ineligible sites within the planning area. Potential adverse effects on known cultural resources could occur from theft or vandalism during construction. Construction would likely deter the normal recreational activity by the general public that currently occurs in the planning area, thereby deterring theft and vandalism from recreation; however, the number of personnel on-site would vary over the construction period and by project.

Each applicant would retain a qualified cultural resources specialist to write and carry out a monitoring and mitigation plan or agreement, when applicable, and to be available if cultural resources are encountered during construction. Avoidance of known cultural resources is generally the preferred resolution option; the plan should include measures to protect avoided resources during construction and to prevent looting, vandalism, and erosion. If project impacts on known NRHP-eligible cultural resources are unavoidable, data recovery may be approved as a mitigation measure; the plan would include a data recovery strategy.

Physical Effects on Previously Undiscovered Resources

An unanticipated discovery plan will be included in the historic properties treatment plan. The plan will include all specified and necessary steps covering discovery, immediate notification of the responsible federal official, ceasing activity, consultation, plans of action if needed, and resumption of activity. Site-specific Native American Graves Protection and Repatriation Act plans of action may be developed with consulting tribes to facilitate repatriation or stabilization for high-sensitivity areas to facilitate any specifically identified outcomes not found in standard plans.

The BLM would also require project applicants to include additional measures for addressing the discovery of previously unknown cultural resources during construction (an inadvertent discovery plan). The developers should consider the following measures from **Appendix B** and the Tonopah RMP and ROD (BLM 1997), at a minimum:

- Hire a qualified archaeological monitor to oversee project excavations and to monitor resources that will be protected from disturbance by construction-related activities.
- Develop and use a cultural resources construction personnel training program to promote cultural resources identification and lawful and appropriate response to discoveries.
- Notify involved agencies of unexpected cultural or historic resources discoveries during construction. The project developers may be asked or ordered to cease construction near the discovery to allow evaluation by an agency archaeologist and formulation of appropriate mitigation measures.
- If human remains are discovered, cease construction and consult with the lead agencies and law enforcement. It is advisable to prepare a plan of action to address anticipated or unanticipated discoveries of materials protected under the Native American Graves Protection and Repatriation Act, even if such discoveries appear to be unlikely based on the survey results.
- Where project construction would directly and adversely affect NRHP-eligible properties, consider selecting scientific data recovery as an appropriate mitigation measure. Conduct data recovery procedures in accordance with a BLM-approved data recovery plan, including detailed research design and methodology.
- Have the cultural resources specialist prepare a report documenting archaeological monitoring and data recovery activities.

Visual, Atmospheric, and Auditory Effects

Construction activities would introduce temporary, nonphysical changes to the surrounding area due to increased noise from heavy equipment and an increase in construction-related traffic in and within the vicinity of the planning area. The atmospheric and audible changes to the setting would be short term and last only the duration of construction; they would not diminish the integrity of any historic property located outside the study area, to the extent that the resources no longer qualify (or may qualify if currently unevaluated) for the NRHP. No adverse effects would occur.

Operation and Maintenance

Physical Effects

During operations, physical effects on historic properties eligible for listing on the NRHP would not occur, as new ground disturbance would not occur. The known NRHP-eligible sites in the development area

(26ES428/26ES1317, 26ES444, and GD-305) would be treated prior to construction (MM CR-1). The nearby NRHP-eligible sites to the planning area would be avoided by development and therefore would not be affected during O&M.

Effects on archaeological resources from theft or vandalism caused by increased public access are not expected. The Proposed Action would not provide new public access to areas with the potential to contain archaeological resources. Any new significant archaeological resources found on the project site during construction would be treated, which would be outlined in the required CRMMP, and the public would not be allowed onto the solar field.

Visual, Atmospheric, and Auditory Effects

Currently, the visual, atmospheric, and auditory effects analysis has not been performed. The potential impacts related to visual changes to the landscape that could diminish the integrity of the setting for those visually sensitive historic properties are undetermined. The potentially impacted eligible historical sites in the planning area pending SHPO concurrence are CrNV-64-18841/26ES444 (Tonopah and Goldfield Railroad), CrNV-64-2048/64-4331/64-12902/26ES428/26ES1317 (Silver Peak Railroad), and GD-305 (historic habitation site).

Decommissioning

At the end of the facility operations, the applicant would remove structures, equipment, and infrastructure from the site and dispose of them in the manner specified in the approved decommissioning, abandonment, and site reclamation plan. Graded areas would be regraded, if necessary, to match the topography of the surrounding area. All disturbed areas would then be revegetated using an approved seed and plant mix. Based on the avoidance measures and plans developed through the construction and operations phases, no adverse effects are anticipated from decommissioning of the projects.

4.5.3 Alternative B. Soils and Vegetation Conservation Alternative

This alternative would be the same as the Proposed Action, but there would be no RMP amendment to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would be based on the additional slope criteria outlined in the Solar RMPA (BLM 2012). In addition, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Mowing would be utilized in the rest of the development area to leave vegetation intact. In mowed areas, vegetation would be mowed to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters), where justified.

Construction

Impacts on historic properties from construction of the seven utility-scale PV solar facilities under Alternative B would be consistent with those described above under the Proposed Action. This is because the location of Alternative B would be the same, so the sites and their eligibility would also be the same. While Alternative B would leave more vegetation on the planning area because it would entail implementation of alternative site preparation methods, the overall visual effects of Alternative B would be the same as those from the Proposed Action due to the project's type and scale. Alternative B would include the mitigation measures identified for the Proposed Action to reduce adverse effects on eligible sites within the development area and to avoid potential adverse effects (as defined under the Section 106 implementing regulations) on eligible sites adjacent to the development area and eligible and unevaluated sites from visual effects during construction.

Operation and Maintenance

Impacts on historic properties from operational activities under Alternative B would be consistent with those described above under the Proposed Action. This is because activities associated with this phase of the project would be the same. No adverse impacts are expected.

Decommissioning

Impacts on historic properties from project termination, decommissioning, and site reclamation activities under Alternative B would be consistent with those described above under the Proposed Action. This is because activities associated during this phase of the project would be the same. No adverse impacts are expected.

4.5.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP. No ground-disturbing construction activities would take place until further NEPA analysis is conducted and individual projects are approved. Therefore, no changes or alterations to the landscape would result. Existing conditions in the area of analysis would continue. Therefore, there would be no impacts on historic properties or unevaluated cultural resources that are sensitive to visual changes to the setting as they relate to the Proposed Action or Alternative B.

4.5.5 Cumulative Effects Analysis

The CESA for cultural resources is 10 miles out from the planning area. The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions. **Table 4-2** lists the reasonably foreseeable projects within the CESA for cultural resources.

Under the Proposed Action, the loss of several resources from a particular tribe or representing a particular time period could result in impacts with respect to the information those resources possess. Past projects or activities in the region could affect resources with similar information about a particular tribe or time frame, resulting in a cumulative effect. The Proposed Action includes measures to minimize potential effects. Also, any future projects within the cumulative effects area, such as roads, transmission lines, and minerals or energy development, would be required to implement similar measures.

It is likely that past actions or projects in the cumulative effects area directly and indirectly affected cultural resources. However, none of the cumulative projects for which documentation is available were found to physically affect resources eligible for listing on the NRHP. Cumulative projects could affect previously unknown cultural resources during construction, but any future mining, energy, or other projects would be required to develop surveys and treatment plans and to implement avoidance and mitigation measures to protect resources. Dispersed recreation and off-road vehicle use in particular may contribute to cumulative effects.

Cumulative impacts on historic properties under Alternative B would be consistent with those described above under the Proposed Action. Under the No Action Alternative, there would be no cumulative effects in the study area.

4.6 HYDROLOGIC RESOURCES

4.6.1 Analysis Methods and Assumptions

This section describes the potential impacts on water resources from the Proposed Action, the Soils and Vegetation Conservation Alternative (Alternative B), and the No Action Alternative (Alternative C). The analysis assesses impacts in terms of the project phase (construction or operation).

Where appropriate, the analysis recommends avoidance, minimization, or mitigation measures to avoid, reduce, or otherwise offset impacts. These measures are summarized in **Appendix B**. Not all design features in **Appendix B** would be applicable to each individual project in the planning area. Rather, this appendix provides a list of measures that the BLM Authorized Officer could require as a condition of approval for a given project. Implementing these measures would avoid, reduce, or mitigate effects. The direct and indirect effects described below are those that could occur after implementing the measures, as applicable.

This analysis makes the following assumptions:

- Unless otherwise noted, the analysis below assumes that each of the seven solar development projects would result in the maximum amount of water use identified in the reasonably foreseeable development scenario (Supplemental Information Report, Appendix A; BLM 2024b) and each project plan of development. The precise timing for project startup and construction and some sources of water are not known at this time. The analysis assumes that the maximum water demand and water transportation (truck trips) would occur during construction and could happen concurrently throughout the planning area.
- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario (Supplemental Information Report, Appendix A; BLM 2024b) and each project plan of development. The precise location and arrangement of facility components within each project area, and thus the total acres of surface disturbance in each project area, are not known. Therefore, the analysis assumes that soils and vegetation anywhere within the entire project area could be disturbed in the short term, during and shortly after construction. Interim reclamation would take place on portions of the cleared construction areas and access roads that are not needed for ongoing operational or maintenance purposes. Direct effects on water resources due to surface disturbance would occur in the planning area during construction and O&M of the proposed facilities. Indirect effects could occur farther away from the planning area.
- Consistent with the above assumptions, the acres and miles of water resources that would be disturbed are equal to the sum of those within the planning area. The total acres and miles of these elements in the planning area are included in the descriptions of surface water resources, groundwater resources, wetlands, riparian zones, and floodplains in **Section 3.2**, Affected Environment.

Table 4-6. Water Resource Impact Indicators

Resource Characteristic	Issue Statement	Analysis Measure/Issue Indicator
Surface water quality of ephemeral streams, wetlands, and riparian zones	How would construction affect ephemeral streams, wetlands, and riparian zones in the planning area?	• Miles or acres of ephemeral streams, wetlands, and riparian zones disturbed in the short term and long term • Potential for water quality impacts from increased erosion and sedimentation
Jurisdictional WOTUS and waters of the State	How would construction affect jurisdictional WOTUS and waters of the State in the planning area?	• Acres of jurisdictional WOTUS and waters of the State disturbed during construction
Groundwater and water consumption	How would water consumption for construction and O&M activities affect groundwater resources in the planning area?	• AF of water used per month for construction • AF of water used annually for O&M • Comparison to groundwater use and availability for basins underlying the planning area

The analysis area for direct impacts on water resources is the planning area. It includes all surface water, groundwater, wetlands, riparian zones, and floodplains within the planning area. The location of selected water resources was overlaid with the location of the planning area to compare alternatives; however, due to the limited data available, the selected water resources may not account for the full range of impacts on water resources that could occur.

The analysis area for indirect and cumulative impacts is the three 12-digit HUC sub-watersheds that overlap the planning area: Barrel Spring–Big Smoky Valley, Frontal Columbus Salt Marsh, and Angel Island–Clayton Valley.

No perennial streams, 303(d)-listed streams,[33] jurisdictional WOTUS, source water protection areas, or FEMA flood zones are included in this analysis; this is because none are in the planning area.

4.6.2 Alternative A. Proposed Action

The proposed Esmeralda 7 solar facilities include Lone Mountain Solar, Smoky Valley Solar, Gold Dust Solar, Nivloc Solar, Esmeralda Energy Center, Red Ridge 1 Solar, and Red Ridge 2 Solar. During the project construction phase, which would range from 18 to 36 months, depending on the solar facility, approximately 10,607 AF of water would be used for dust control, soil compaction, reclamation, preparation of any concrete required for foundations, and other activities. Based on the Supplemental Information Report (BLM 2024b), the total annual water use for O&M is expected to be approximately 403 AFY.

Depending on the status of the existing rights, water leased or purchased from a public or private entity could require changes in place of use, manner of use, and point of diversion approved by the state engineer. Temporary change applications could be used for construction water, while operational water would require a permanent change application approval by the state engineer. The solar facility applicants would contact the holders of water rights in the basin and file applications for changes in place of use, manner of

[33] The term "303(d) list" or "list" is short for a state's list of impaired and threatened waters (for example, streams, river segments, and lakes).

use, or point of diversion with the state engineer, after reaching any agreements to procure water from water rights holders.

Potential water sources have not yet been identified for the purpose of this Draft PEIS/RMPA. Confirmed sources of future water, as well as potential parties interested in a water transfer from the locally appropriated basin and outside counties or basins, will be outlined in the site-specific NEPA analysis. Some project applicants have indicated they might truck water to the project area in 3,500-gallon water trucks. Under a worst-case scenario in which all the required water is trucked to the site, it is estimated that more than 987,400 trips would be needed to truck all the water needed during construction. The number of trips required for each year of construction would depend on the construction schedules. More than 37,500 trips per year (approximately 102 trips per day) might be necessary to truck all the water needed for O&M to the site.

Transporting water may not directly impact water quantity within the planning area. However, transporting water has the potential to indirectly affect the water quality of water resources in the planning area by altering the water quality of surface water and groundwater and by alternating the water quality and function of wetlands and riparian areas due to increased erosion, increased sedimentation, and altered drainage patterns from increased vehicle traffic and road maintenance. Until the details concerning the sources of water are established, the estimated number of truck trips is an indication of how the quantity of water involved, the timing of application, and the trade-offs between using water nearby (such as installing temporary use wells in Basin 137A or adjacent basins) could directly and indirect impact water quantity and water quality.

To provide sufficient water for construction activities, temporary storage ponds could be constructed. This would provide sufficient water for dust control during construction without negatively affecting well drawdown during peak water usage periods. After the construction period, the construction water storage pond would be re-leveled to grade, and the lining would be removed.

The proposed PV technology for these projects does not require water for electricity generation. During operations, water would be used for washing PV arrays, periodic dust control, maintenance, and O&M facilities. The estimated water requirement for maintaining the solar facility is up to 120 AFY, depending on the facility size and solar technology used. The cleaning frequency may be lower or higher based on on-site conditions. The water used for cleaning is expected to evaporate quickly, eliminating the need for disposal. Water for panel cleaning would be obtained from a commercially permitted supplier by trucking it in as needed or storing it on-site in tanks. Alternatively, water could be sourced from temporary use wells within the solar facility boundary.

Essential equipment would be protected from flooding by mounting solar panels, inverters, and other critical components above potential flood levels to prevent water damage during flooding events and further improve the project's resiliency. As necessary, enclosures or cabinets would be used to house sensitive electrical components, such as inverters and control systems, to provide an additional layer of protection against water intrusion. A site drainage plan may also be developed to help channel excess water away from equipment and prevent pooling or ponding during floods.

The Proposed Action would also incorporate all the design features and BMPs identified in **Section B.4** of **Appendix B** and would include measures for erosion and sediment control, flood control, spill prevention, and stormwater monitoring and response. Direct impacts on water resources may be avoided based on the final siting and design of individual facilities.

Impacts on surface water resources, wetlands, and riparian areas from construction could include increased sedimentation from road runoff and modifying stream channels and floodplains from road crossings, bridges, and culverts. Increased sedimentation could also occur from increased erosion due to ground-disturbing activities. Accidental spills of harmful substances could also contaminate surface water resources, wetlands, and riparian areas, increasing water quality degradation.

Impacts on groundwater resources from construction could include groundwater drawdown due to withdrawal for dust control, soil compaction, reclamation, preparation of any concrete required for foundations, and other construction activities. Groundwater pumping would also capture water that would otherwise discharge to springs and streams or be used by shrubland ecosystems within the planning area. Accidental spills of harmful substances could contaminate shallow groundwater resources, resulting in decreased water quality.

The timing and magnitude of impacts on groundwater resources would depend on the location of the well, the aquifer properties, and the pumping rate. However, changes to existing groundwater levels are expected to be within accepted levels; this is because water would be leased or purchased from private or public sources with water rights, and project-specific quantitative analysis, design features, and BMPs would be implemented to ensure sustained yield and management of water as a renewable resource.[34] An individual project's responsibility would be determined on a case-by-case basis if multiple projects are drawing from the underlying groundwater basin.

Impacts on surface water resources, wetlands, and riparian areas from O&M activities would include increased sedimentation from road runoff and ground-disturbing activities and increased water quality degradation from accidental spills. Impacts on groundwater resources from O&M activities could include groundwater drawdown due to withdrawal for washing PV arrays, periodic dust control, maintenance, and O&M facilities. These impacts are similar to those from construction; however, impacts from O&M activities would be less frequent and intense.

Climate change projections indicate that precipitation patterns may become more variable and extreme in the future, posing challenges to the long-term viability of solar development projects. Changing precipitation patterns may have impacts on the proposed project. Shifts in precipitation patterns may affect the availability of water resources, leading to potential shortages or increased competition for limited water supplies. Heavy rainfall or prolonged wet conditions may cause construction delays by making the site inaccessible or hindering construction activities. Excessive precipitation may result in erosion, soil instability, and mudslides, further complicating the construction process, causing delays, and increasing project expenses.

Additionally, increased precipitation can lead to greater runoff from solar arrays and impervious surfaces associated with the project, potentially overwhelming existing stormwater management infrastructure.

[34] 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 including water; and DOI policy directs the BLM to adopt policies which encourage the management of water as a renewable natural resource and to conduct its public land management activities in a manner to promote the conservation of water supplies (600 DM 2).

Changes in precipitation patterns could also alter the frequency and intensity of flooding events, posing risks to solar infrastructure and adjacent properties. Flood damage can disrupt O&M, cause equipment failures, and result in costly repairs. While solar development does not directly cause changes in precipitation patterns, changes in land use from the proposed project may affect evapotranspiration rates, surface runoff, and soil moisture levels, which in turn may influence precipitation patterns in the area (see **Section 4.1** for an additional discussion on the impacts from climate change).

4.6.3 Alternative B. Soils and Vegetation Conservation Alternative

Alternative B is similar to the Proposed Action because the water requirements would remain the same, and the same amount of each project area would be disturbed during construction. However, under Alternative B, surface disturbance would be less than it would be under the Proposed Action. This is because a maximum of 35 percent of the proposed development area would be graded, and the remaining 65 percent would be mowed down to 18 to 24 inches tall. This construction method would result in similar soil disturbance and compaction, but it would reduce vegetation removal compared with the Proposed Action. The impacts on surface water resources, wetlands, and riparian areas from construction would be less than those under the Proposed Action; this is because of the decreased erosion and sedimentation due to less vegetation removal.

4.6.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP and the existing water resource uses and trends would continue. Water would not be used for the proposed Esmeralda 7 projects in the planning area at the levels or timeframes described under the Proposed Action, and surface disturbance associated with project construction would not occur. Until additional analysis is completed, and projects are approved, there would be no effects from the solar projects on water resources. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation on existing routes, highway vehicle use, and road maintenance, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized impacts on surface water and wetlands, such as increased sedimentation from erosion and increased water quality degradation from accidental spills.

4.6.5 Cumulative Effects Analysis

The CESA for water resources is the 12-digit HUC sub-watersheds that overlap the planning area.

The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

The BLM has identified past, present, and reasonably foreseeable future actions (**Table 4-7**, **Figure 4-1**, **Appendix A**) that overlap both spatially and temporally with the Proposed Action (Alternative A), and the Soils and Vegetation Conservation Alternative (Alternative B) on BLM-administered lands in the CESA and, thus, are relevant for the analysis.

Table 4-7. Past, Present, and Reasonably Foreseeable Future Actions

Reasonably Foreseeable Action	Brief Description of the Action	Size in the CESA (acres unless noted)
Greenlink West	NV Energy has proposed a system of new 525, 345, and 120 kV electric transmission facilities on private, state, and federal lands between northern and southern Nevada. The project will run from Las Vegas to Reno through Clark, Nye, Esmeralda, Mineral, Lyon, Story, and Washoe Counties.	40
Western Bounty	Gallatin Power has proposed a direct current transmission line.	1,080 acres (30 miles)
Sierra Pacific Power Company	Transmission ROW	59.6
Ormat Nevada	Transmission ROW	1,418
American Glory	Solar ROW	6,921
Ormat Nevada	Geothermal lease	5,078
Baseload Power US Holdings	Geothermal lease	4,884
Ram Power	Geothermal lease	40,092
Vegas to Reno OHV SRP	Best in the Desert Vegas to Reno desert OHV race. The event is held on public lands managed by the BLM Tonopah, Stillwater, and Sierra Front Field Offices. The race covers approximately 521 miles. The race occurs on 1 day, but public access to the race area may be impeded by race use for 2 days (the day of the race and the prior day).	270 miles
Naturgy Candela Devco	Solar development	5,725
Vanderbilt Minerals Corporation	Road ROW	8.5
AT&T	Telephone ROW	797.8
Rulco LLC	Potassium prospect	2,534
Kinross Gold	Hard-rock mining and exploration	7,673
Authium LLC	Hard-rock mining and exploration	100
Neolith Energy	Lithium mining	1,280
Centrestone Resources LLC	Mining	1,295
Allegiant Gold	Mining	300
Authium LLC	Hard-rock mining and exploration	100

Source: BLM GIS 2023

Past, present, and reasonably foreseeable future actions that have affected and would continue to affect water resources in the CESA are ROWs for energy transmission, energy generation, minerals exploration and development, and roadways. In addition, construction, operation, and maintenance of most of these actions have and would continue to remove and disturb vegetation and soils, resulting in increased erosion and sedimentation, altered natural drainage patterns and surface water runoff, and subsequently the degradation of the quality and function of surface waters resources, wetlands, riparian areas, and floodplains.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action (Alternative A), and the Soils and Vegetation Conservation Alternative (Alternative B) would contribute to water resource impacts due to construction, as described above. Implementing the required design features and avoidance, minimization, and mitigation measures identified in **Section B.4** of **Appendix B** would minimize, but not completely avoid, the alternatives' contribution to the cumulative effects.

4.7 Geology and Minerals

4.7.1 Analysis Methods and Assumptions

This section describes the potential impacts on geology and mineral resources from the Proposed Action, Alternative B, and the No Action Alternative. The analysis assesses impacts in terms of the project phase (construction or operation).

This analysis makes the following assumptions for the purposes of analysis:

- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario (Supplemental Information Report, Appendix A; BLM 2024b) and each project's plan of development. The analysis assumes that the maximum amount of land segregated or withdrawn would remove surface access for fluid mineral development, mining (both placer and hard rock) of locatable and leasable minerals, and the development of mineral materials.
- The precise location and arrangement of facility components within each project area, and thus the total acres of surface disturbance in each project area, are not known. Therefore, the analysis assumes that geological features within the entire planning area could be disturbed.

4.7.2 Alternative A. Proposed Action

Under the Proposed Action, utility-scale solar energy development would be incompatible with most mineral development activities. It would preclude these activities within developed areas once the solar energy facilities are constructed. There are claims adjacent to the planning area that could potentially access similar minerals to those within the planning area. It could be more difficult to economically develop these minerals if contiguous mineral claims are not able to be developed.

Under the Proposed Action, up to 62,300 acres would be precluded from most fluid mineral and mining development activities. The Proposed Action would likely result in the construction of utility-scale solar energy developments, which would preclude the development of fluid minerals (primarily geothermal) and most mineral exploration and development activities within the planning area. The Proposed Action could limit the development of mineral resources within the planning area by not allowing surface occupancy and subsurface entry to use potential mineral resources. Existing claims and leases would retain valid existing rights associated with the lease or claim; this could result in some parts of the planning area being precluded from construction of solar facilities. Any conflicts between the surface use of the land for solar energy production and access to minerals would be addressed in accordance with appropriate regulations and the design features listed in **Section B.5** of **Appendix B**.

Under the Proposed Action, geological features in the planning area could be disturbed or damaged by surface-disturbing activities, such as grading; installing pylons or piers for solar array mounting; and construction of foundations for buildings, substations, and transmission lines. Most of the planning area is located in Quaternary-age playa, lake beds, and floodplain deposits; these types of deposits are typically poorly consolidated and provide limited value in the geological record. No record of unique or valuable geological features within the planning area was discovered in a search of available scientific literature or received in scoping comments.

The Proposed Action is not expected to have any impact on regional geological hazards, such as seismic activity. As part of the geotechnical surveying that would be conducted for each proposed project, any small-scale geological hazards, such as unstable soils or landslide hazard areas, would be identified. Mitigations would be developed, if needed, to protect workers or equipment.

4.7.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, there would be no RMP amendment to change the slope requirement for the planning area to a maximum of 10 percent. This management would be not result in different impacts on geology and minerals from the Proposed Action. Impacts on geology and minerals would be the same as those described under the Proposed Action.

4.7.4 Alternative C. No Action Alternative

Under Alternative C, the No Action Alternative, the BLM would not amend the Tonopah RMP. Should the Notice of Segregation[35] on the area be terminated, the land would automatically reopen to appropriation under the public land laws, including the mining laws. All existing geothermal leases and mining claims would be available for further exploration and development. The area would be open to location of claims, lease nominations, and applications for mineral materials disposal. Impacts on mineral resources from the No Action Alternative would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, no potential impacts on geological features from surface-disturbing activities would occur.

4.7.5 Cumulative Effects Analysis

The CESA for geology and minerals is the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The proposed construction of the Green Link West project and development of enhanced geothermal system technology may increase interest in geothermal exploration and development within the planning area due to reduced costs to get electricity to the market and the need not to have traditional geothermal systems present. Past geothermal exploration has identified a high temperature gradient and the potential for a geothermal resource that could be developed in the region. There are existing leases and an idle geothermal well in the CESA. The BLM has a proposed geothermal lease sale in October 2024 within the CESA.

When combined with many of the past, present, and reasonably foreseeable future actions, the Proposed Action would contribute to cumulative effects on mineral and geological resources. Actions that would withdraw mineral resources, or preclude or be incompatible with mineral development, would cumulatively reduce the availability of mineral resources for development and use. Actions that would result in surface or subsurface ground disturbance could result in cumulative damage to valuable geological features in the CESA.

[35] The BLM Tonopah Field Office announced a two-year segregation of public lands included in seven rights-of-way applications for the proposed project areas, from appropriation under the public land laws, including the Mining Law, but not the Mineral Leasing or Material Sales Acts, for a period of two years from the date of the notice (July 27, 2022), subject to valid existing rights. This segregation is to allow for the orderly administration of the public lands to facilitate consideration of development of renewable energy resources. The public lands segregated by this notice total 118,630.90 acres. The *Federal Register* notice is available here online: https://www.federalregister.gov/documents/2022/07/27/2022-16064/notice-of-segregation-of-public-land-for-the-esmeralda-solar-projects-esmeralda-county-nevada.

Cumulative effects under Alternative B would be the same as those described for the Proposed Action.

Under the No Action Alternative, there would be no contribution to cumulative effects in the CESA.

4.8 LANDS, REALTY, AND CADASTRAL SURVEY

4.8.1 Analysis Methods and Assumptions

This section describes the potential impacts on land uses from the Proposed Action and Alternative B. Where appropriate, the analysis considers design features such as avoidance, minimization, or other measures to avoid, reduce, or otherwise offset impacts. These design features are outlined in **Section B.6** of **Appendix B**.

Information was obtained from various federal, state, and local agency documents and maps, including BLM RMPs, city and county land use plans, and aerial imagery for the land use planning area.

Indicators

- Conflicts with, or substantial modifications or terminations of, existing or planned land uses, ROWs, or land use authorizations
- Alterations to land use patterns or other use areas near the planning area
- Conflicts with federal, state, and local land use plans, goals, and policies

Assumptions

- Each of the seven solar development projects would result in the maximum amount of surface disturbance identified in the reasonably foreseeable development scenario and each project's plan of development. The precise location and arrangement of facility components, including the gen-ties line boundaries for each project, are not known.
- All existing leases, permits, and ROWs would continue, subject to individual terms and conditions as authorized by BLM regulations.
- No lands will be purchased, exchanged, or acquired within the planning area.
- County plans are current as stated and will not be modified to exclude solar energy in the future.

4.8.2 Alternative A. Proposed Action

Changes to ROW exclusion or avoidance areas are not being considered in this PEIS/RMPA. There would be no changes to existing ROW areas. All existing ROWs are described in the 1997 Tonopah RMP and ROD. Future RMPAs may open or close areas to future ROW development, but for the scope of this PEIS/RMPA, the BLM is not considering these changes. If approved and all solar sites are developed, the Proposed Action would bring an additional 5.6 GW of power to Nevada's electric grid. This large influx of power may necessitate the additional approval or development of additional utility and energy-related infrastructure.

The Proposed Action would not conflict with existing commercial, residential, agricultural, utility, transportation, or communication facilities in the planning area. This is largely due to the predominant BLM-administered lands in the planning area. The potential impacts on industrial uses (such as minerals and gravel, or mineral claims) are discussed further under **Section 4.6**, Geology and Minerals. Details on visual impacts arising from the Proposed Action or alternatives are discussed further under **Section 4.17**, Visual Resources, including Night Skies.

The Proposed Action would be consistent with local land use plans; however, it would be inconsistent with the 1997 Tonopah RMP and ROD. Potential amendments to the Tonopah RMP would modify the VRM class objectives. Additionally, portions of the Esmeralda 7 operations would not conform to the Solar RMPA (BLM 2012), which amended the Tonopah RMP and ROD (BLM 1997) and limits the siting of solar panels to lands with slopes that are 5 percent or less.

4.8.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, impacts on ROWs, land use authorizations, and land use patterns would be the same as described under the Proposed Action. However, under Alternative B, there would be no amendment to the Tonopah RMP to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would be based on the additional slope criteria outlined in the Solar RMPA (BLM 2012). Development would only be allowed based on the criteria; otherwise, this alternative would not be consistent with the 2012 Solar RMPA, which amended the Tonopah RMP.

4.8.4 Alternative C. No Action Alternative

Under the No Action Alternative, there would be no impacts on ROWs, land use authorizations, and land use patterns at this time. Each solar project would be subject to NEPA analysis and approval for future development. Demand for utility and energy-related ROW applications and approvals would remain at current levels until future development occurs.

Under the No Action Alternative, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements.

4.8.5 Cumulative Effects Analysis

The CESA for lands and realty is the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, land use in the CESA are as follows: large-scale utility projects, the Greenlink West and Western Bounty projects; transmission ROWs, solar ROWs, road ROWs, and telephone ROWs; and multiple current, future, and potential geothermal, solar, and mining projects.

Renewable energy development places a demand on the lands and realty program, both in the form of new site ROWs for generation facilities and for power lines, roads, and other supporting infrastructure. Because solar is the primary renewable energy source in and outside the planning area, effects on lands and realty would primarily be the result of new or expanded solar energy development in the planning area. There are several solar, transmission ROWs, mining claims, road ROWs, wind, and geothermal projects that are near the planning area. They are not anticipated to have an impact on the CESA. However, some of these projects may traverse the planning area to connect to Nevada's electric grid in the future.

When combined with the past, present, and reasonably foreseeable future actions, the Proposed Action could contribute to cumulative effects on land use authorizations and siting of new, future ROWs.

Cumulative effects under Alternative B would be the same as those described for the Proposed Action.

Under the No Action Alternative, development of solar projects in the planning area would be subject to additional NEPA review to develop in the future. As a result, there would be no contribution to cumulative effects in the CESA. Existing and future trends and actions associated with population growth, electrical infrastructure development, renewable energy facilities, and ROW authorizations have and would continue to influence existing land use authorizations in the CESA through the conversion of agricultural land or rangeland for other uses, and by increasing the number of existing ROWs and communication sites in the planning area.

4.9 Lands with Wilderness Characteristics

4.9.1 Analysis Methods and Assumptions

The study area for lands with wilderness characteristics is the planning area. Indicators for lands with wilderness characteristics include changes in naturalness, size, and opportunities for solitude or primitive and unconfined recreation. The analysis uses the following assumptions:

- Trends for recreational use will continue into the foreseeable future.
- Short-term impacts on lands with wilderness characteristics would occur during the construction period.
- Long-term impacts on lands with wilderness characteristics would occur during O&M of the proposed infrastructure and ancillary systems and during decommissioning.

4.9.2 Alternative A. Proposed Action

Construction

Where development from implementing the Proposed Action would intersect existing inventoried lands with wilderness characteristics units, there would be impacts from construction activities, including direct ground disturbance and temporary increases in ambient noise levels. Ground disturbance would occur across all the temporary or permanent ROW areas; this disturbance would temporarily impact opportunities for solitude and primitive and unconfined recreation. It also would have long-term effects on the apparent naturalness within the planning area.

Operations and Maintenance

Impacts associated with O&M activities could include disturbance to wildlife and recreationists during annual inspections using helicopters, all-terrain vehicles, or line trucks. Emergency maintenance also would likely be necessary under certain circumstances. The Proposed Action would have the potential to alter recreational access to the inventoried lands with wilderness characteristics. Maintenance roads constructed would provide improved access to any inventoried lands with wilderness characteristics that are nearby; recreational opportunities could increase accordingly. These roads would be permanent and open to the public; they could also contribute indirectly to the creation of social (unauthorized) roads and trails. This type of impact would most likely occur where the permanent ROW is relatively close to inventoried lands with wilderness characteristics units.

Localized areas of the ROW areas would, where needed, be cleared of vegetation to allow for maintenance of the solar infrastructure facilities and transmission lines. Compared to periods of construction, regular maintenance activities associated with the substations and transmission lines would be more infrequent and would be of shorter duration. During O&M, visibility of the transmission line and ancillary facilities, and vegetation clearing in the ROW areas, would result in changes to the natural setting. The magnitude of the change would depend on the characteristics of the landscape, such as the type of terrain, landforms, and vegetation; physical distance to project components; and backdrop conditions. However, it is likely that the O&M would alter the apparent naturalness of the area.

Motorized travel along the ROW (for inspection, maintenance, and brush clearing) that occurs adjacent to a given existing inventoried lands with wilderness characteristics unit would result in sounds that would degrade the natural setting and affect people's opportunities for solitude and primitive recreation. In a given existing inventoried lands with wilderness characteristics unit intersected by the Proposed Action, sound generated during O&M would occur intermittently for the life of the Proposed Action. Sounds and noise levels would be site specific and would impact wilderness characteristics and opportunities for solitude in the immediate vicinity.

Impacts on inventoried lands with wilderness characteristics units would occur when transmission lines or a new access road would cross or subdivide a lands with wilderness characteristics unit and create one or more sub-units less than 5,000 acres in size. Because BLM Manual 6310 establishes 5,000 acres as the minimum size threshold for lands with wilderness characteristics, areas that fall below this threshold would no longer meet the criteria to be identified as a lands with wilderness characteristics unit (BLM 2021a). BLM Manual 6310 does contain size exception criteria to the 5,000-acre threshold, such as being adjacent to a designated wilderness area or a wilderness study area.

Decommissioning

Short-term impacts from decommissioning-related activities on inventoried lands with wilderness characteristics would be similar to those from construction. All structures and equipment would be removed from the site, and all disturbed areas would then be revegetated using an approved seed and plant mix. These actions would result in sounds that would degrade the natural setting and affect people's opportunities for solitude and primitive recreation. Over time, decommissioning would aim to restore the naturalness of the area.

4.9.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, the effects on inventoried lands with wilderness characteristics would be similar to the effects described under the Proposed Action. During decommissioning, effects on the apparent naturalness of inventoried lands with wilderness characteristics would be lessened under this alternative due to the reduced time for regrowth of vegetation in areas that were mowed instead of graded.

4.9.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP and surface disturbance from construction would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, there would be no effects from construction on inventoried lands with wilderness characteristics. Ongoing human uses of the planning area, including ROW maintenance, livestock grazing operations and range improvements, off-road recreation on existing roads, and road maintenance, would continue to result in localized ground disturbance and effects on inventoried lands with wilderness characteristics.

4.9.5 Cumulative Effects Analysis

The CESA for lands with wilderness characteristics is 10 miles out from the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). Reasonably foreseeable actions within the CESA are listed in **Table 4-2**. Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, inventoried lands with wilderness characteristics in the CESA include mineral exploration and development, renewable energy development, livestock grazing, recreation, travel management, and vegetation and fuels treatments. Construction, operation, and maintenance of most of these actions have removed vegetation; they also would continue to create ground disturbance and temporary increases in ambient noise levels and human presence that could impact the inventoried lands with wilderness characteristics in the CESA.

When combined with these past, present, and reasonably foreseeable future actions, Alternatives A, B, and C would contribute to surface disturbance and noise. Construction of the utility-scale solar energy projects under Alternatives A and B would remove all vegetation within the facilities' disturbance footprints during land-clearing and land-grading operations. Under Alternative B, 35 percent of the vegetation would be removed. The primary potential impacts associated with these operations would be temporary and permanent alterations to the naturalness of the area. Noise would be temporarily generated from constructing and maintaining proposed infrastructure, which would affect opportunities for solitude.

Combined with past, present, and reasonably foreseeable future actions, the action alternatives would increase the presence of infrastructure that could impact the inventoried lands with wilderness characteristics when transmission lines or new access roads cross or subdivide a lands with wilderness characteristics unit and alter the size of the unit to be less than 5,000 acres. Areas that fall below 5,000 acres would no longer meet the 5,000-acre criterion to be identified as lands with wilderness characteristics. BLM Manual 6310 does contain size exception criteria to the 5,000-acre threshold, such as being adjacent to a designated wilderness area or a wilderness study area.

Recreational use and energy developments will create alterations to the landscape over time through an increase in human presence, vehicle use, and road use in certain areas. With these alterations, there will be a need for recurring updated inventories of lands with wilderness characteristics to evaluate if wilderness characteristics are still present. Livestock grazing, wildlife infrastructure, and other land use activities may also impact lands with wilderness characteristics. Although the effects on minor features from these sources may be substantially unnoticeable, they may cumulatively affect the area's apparent naturalness with increased use.

4.10 NATIVE AMERICAN CONCERNS

4.10.1 Analysis Methods and Assumptions

This section describes the potential effects on Native American concerns from the Proposed Action and alternatives. As stated previously, the PEIS/RMPA and ROD will not approve any individual ROW grants. Rather, a site-specific analysis for individual projects would be conducted through subsequent tiered NEPA documentation. The cultural resources discussion in **Section 4.4** and in the Cultural Resources Supplemental Environmental Report (BLM 2024e) provide additional detail on cultural and historic resources in the planning area.

The planning area is in the alkali flats of desiccated Pleistocene-age Lake Tonopah. It is east of the Sierra Nevada and the White Mountains, northeast of the Silver Peak Range, west-northwest of Weepah Hills, west of Lone Mountain, and south of the Monte Cristo Range. The Pleistocene-age Lake Tonopah is within the hydrologic Great Basin, a 200,800-square-mile closed drainage basin that covers nearly all of Nevada, western Utah, eastern California, and southeastern Oregon. The planning area is in a transitional zone between the Great Basin and the Mojave Desert of the Tonopah Basin (Bryce et al. 2003); it demonstrates a mixture of Mojave and Great Basin characteristics.

The project's study area ranges in elevation between 4,800 and 5,300 feet above the mean sea level. The study area is in the Central Basin (south-central Nevada) Range Level III ecoregion, which is characterized by a mosaic of xeric basins, scattered low and high mountains, and salt flats (USGS 2003). In short, this study area is found approximately 30 miles southwest of present-day Tonopah, Nevada, at the southern end of the Big Smoky Valley.

Impacts on Native American concerns can occur through the destruction or degradation of important plant and water resources, 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 geological formations or geographic locations.

Programmatic design features from the Solar RMPA (BLM 2012), which are outlined in **Appendix B**, are required for all solar development, as applicable for each project. In addition, the 1997 Tonopah RMP and ROD (BLM 1997) specify the following mitigation measures, which would be implemented to minimize adverse impacts on Native American resources:

- MM CR-1: Eligible Historic Property Treatment Options (refer to **Section 4.4**, Cultural Resources)
- MM CR-2: Cultural Resources Management and Mitigation Plan (refer to **Section 4.4**, Cultural Resources)
- MM CR-3: Discovery of Human Remains (refer to **Section 4.4**, Cultural Resources)

4.10.2 Alternative A. Proposed Action

Construction

Construction of the facilities would include site preparation and stabilization, temporary use areas, gravel and aggregate materials, water sources and storage, dust and stormwater control, and reclamation in temporary disturbance areas. These are described in the Supplemental Information Report, Appendix A, Section A.2.2 (BLM 2024b). The workforce sizes and schedules, typical construction equipment, and construction sequencing and methods for the PV solar arrays, electrical collection and transmission systems, and substations are also described in Appendix A, Section A.2.2.

The timelines for construction would vary by project with estimates of 18 to 36 months. The timing of project approvals and the availability of the construction contractors and workforce would also differ by project. It is assumed that full buildout of all projects could be completed within 5 years from the ROD for the PEIS/RMPA. Based on the 5-year buildout, 845 workforce personnel could be anticipated within the planning area at any given time.

Culturally Important Wildlife and Botanical Resources

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. Most of the planning area is in the Range Level III ecoregion, which is characterized by the Central Basin Range and the Mojave Basin and Range, with scattered low and high mountains and salt flats (USGS 2003). Three dominant vegetation zones can be found within the planning area: Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain Basins Mixed Greasewood Flat, and Inter-Mountain Basins Playa. The Inter-Mountain Basins Mixed Salt Desert Scrub zone is found on saline basins, alluvial slopes, and plains. It is dominated by species that include shadscale saltbush (*Atriplex confertifolia*), flouring saltbush (*A. canescens*), Wyoming sagebrush (*Artemisia tridentata*), squirreltail (*Elymus elymoides*), and ephedra.

The Inter-Mountain Basins Mixed Greasewood Flat community is concentrated near drainages on stream terraces, on flats, and in rings around more sparsely vegetated playas. It supports species such as greasewood (*Sarcobatus vermiculatus*), fourwing saltbush, shadscale, rabbitbrush (*Chrysothamnus nauseosus*), and winterfat (*Krascheninnikovia lanata*). The Inter-Mountain Basins Playa zone is generally barren of vegetation, with sparse vegetation consisting of iodine bush (*Allenrolfea occidentalis*), greasewood, spiny hopsage (*Grayia spinosa*), and various grasses such as Indian ricegrass (*Achnatherum hymenoides*) and galleta grass (*Pleuraphis jamesii*) (Huckleberry et al. 2001; USGS 2005). Invasive species have also become dominant within the planning area, including Russian knapweed (*Acroptilon repens*), saltlover (*Halogeton glomeratus*), and hoary cress (*Lepidium draba*).

The planning area also supports a variety of reptile, amphibian, bird, and mammal species that are adapted to the hot, dry environment. More than 25 reptile species have been identified in the planning area, including Great Basin spadefoot and northern red-legged frog. There are a variety of lizard species, including the desert horned lizard, Great Basin collared lizard, long-nosed leopard lizard, side-blotched lizard, western fence lizard, western whiptail, and zebra-tailed lizard, and several snake species including coachwhip, panamint rattlesnake, glossy snake, gopher snake, ground snake, and night snake (Stebbins 2003; USGS 2007).

Bird species in the planning area include ash-throated flycatcher, burrowing owl, common raven, ladder-backed woodpecker, Le Conte's thrasher, American kestrel, golden eagle, great horned owl, long-eared owl, red-tailed hawk, and turkey vulture (USGS 2007). Mammal species include cougar, elk, mule deer, white-tailed antelope, Nelson's bighorn sheep, pronghorn, American badger, black-tailed jackrabbit, bobcat, burro, coyote, desert cottontail, gray fox, kit fox, and red fox (USGS 2007). Several species of small mammals, including squirrels, rodents, bats, and shrews, are also found in the planning area.

Traditional Cultural Properties

The Proposed Action could have adverse effects on TCPs and precontact archaeological resources important to Native Americans. Known TCPs must be avoided. Any known or discovered NRHP-eligible archaeological and historic sites discovered during construction of the Proposed Action would be treated (refer to **Section 3.6**, Cultural Resources for further details). The known NRHP-eligible precontact sites in the planning area (D458, RR1-S-001, and RR2-S-032) would be treated prior to construction. As stated before, RR1-S-001 and RR2-S-032 do not have descriptions of the site provided in the Class III inventory reports; they are pending BLM consultation with consulting tribes. Both RR1-S-001 and RR2-S-032 have site dimensions that use a default centroid point with a 98-foot-diameter site boundary.

The planning area is situated on an alluvial fan in the southernmost quadrant of the Big Smoky Valley. D458 consists of 45 archaeological resources ranging from complex sites with multiple hearth features, various ground stone, and lithic reduction flakes to simple flake scatters. The presence of occasional tools—including diagnostic projectile points—and organic material for radiocarbon dating gives the cultural district important potential to yield information critical to the chronological resolution of tool types. An

Elko corner notched point and a Gatecliff series stemmed point found at two sites within the landscape suggest that for at least these two resources, occupation was sometime during the last 8,000 years. D458 suggests seasonal occupation over long periods at a time when above-surface water was still present in the lake, and the landform on which it is situated was a promontory or an island.

Development would avoid the NRHP-eligible precontact sites near the planning area. In accordance with the mitigation and design features, the required CRMMP would include cultural sensitivity and resource training for the construction workers. The Cultural Resources Supplemental Environmental Report (BLM 2024e) concludes that construction has the potential to adversely affect the cultural resources that are within the development area. Visual, atmospheric, and auditory impacts on cultural resources are addressed in **Section 4.1**, Cultural Resources; however, no Native American resources were identified in the visual study area that would be adversely affected by the Proposed Action.

Operation and Maintenance

Effects of the Proposed Action's O&M would be similar to those from construction. This is because the removal of vegetation and effects on wildlife would continue during O&M of the project. Any new significant precontact resources found on the project sites during construction would be treated in accordance with the required mitigation and design features, which would be outlined in the required CRMMP.

Decommissioning

At the end of operations, all PV arrays, structures, equipment, and infrastructure would be removed from each project area and disposed of in the manner specified in the approved decommissioning, abandonment, and site reclamation plan. Graded areas would be regraded, if necessary, to match the topography of the surrounding area. All disturbed areas would then be revegetated using an approved seed and plant mix.

Decommissioning details would be developed and provided to the BLM at the time permanent closure is closer and more information is available. The BLM would require the applicants to submit a decommissioning, abandonment, and site reclamation plan. The plan would include all activities required to dispose of or store all hazardous and toxic materials and chemicals associated with the project. This plan would discuss all currently applicable laws, ordinances, regulations, and standards associated with the safe storage or disposal of these materials.

4.10.3 Alternative B. Soils and Vegetation Conservation Alternative

This alternative would be the same as the Proposed Action, but there would be no RMP amendment to change the slope requirement for the planning area to a maximum of 10 percent. Development on slopes greater than 5 percent would be based on the additional slope criteria outlined in the Solar RMPA. In addition, applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Mowing would be utilized in the rest of the development area to leave vegetation intact. In mowed areas, vegetation would be mowed to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters), where justified.

Construction

Impacts on TCPs and cultural resources from construction of the seven utility-scale PV solar facilities under Alternative B would be consistent with those described above under the Proposed Action. This is because the location of Alternative B would be the same, so the sites and their eligibility would also be the same. While Alternative B would leave more vegetation on the planning area because it would entail implementation of alternative site preparation methods, the overall visual effects of Alternative B would be the same as those from the Proposed Action; this is due to the project's type and scale. Alternative B would include the mitigation measures identified for the Proposed Action (MMs CR-1 and CR-2) to reduce adverse effects on the eligible site within the development area and to avoid potential adverse effects (as defined under the Section 106 implementing regulations) on eligible sites adjacent to the development area and eligible and unevaluated sites from visual effects during construction.

Operation and Maintenance

Impacts on historic properties from operational activities under Alternative B would be consistent with those described above under the Proposed Action. This is because activities associated with this phase of the project would be the same. No adverse impacts are expected.

Decommissioning

Impacts on historic properties from project termination, decommissioning, and site reclamation activities under Alternative B would be similar with those described above under the Proposed Action. This is because activities associated during this phase of the project would be the same. However, the vegetation communities on the project sites are expected to recover more quickly than under the Proposed Action, which would reduce the ongoing effects related to the loss of traditional plants and animals as well as visual effects on the TCPs. No adverse impacts are expected.

4.10.4 Alternative C. 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 until further NEPA analysis is conducted and individual projects are approved. Therefore, no changes or alterations to the landscape would result. There would be no impacts on historic properties or unevaluated cultural resources that are sensitive to visual changes to the setting as they relate to the Proposed Action or alternatives. Existing conditions in the analysis area would continue and the BLM would not amend the Tonopah RMP.

4.10.5 Cumulative Effects Analysis

The CESA for Native American concerns is 10 miles out from the planning area. The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant (**Table 4-1** and **Figure 4-1**, **Appendix A**). Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions. **Table 4-2** lists the reasonably foreseeable projects within the CESA for Native American concerns.

Under the Proposed Action, cumulative projects could affect known and unknown TCPs, resulting in a cumulative loss of resources considered by local tribes to be significant. Many cumulative projects in the area, including the Proposed Action and cumulative solar projects, could result in the loss of native habitat in the Big Smoky Valley. The Esmeralda 7 solar projects, along with the Greenlink West transmission line project, considered for cumulative effects would involve ground disturbance, wildlife disruption, and vegetation clearing, resulting in the loss of native vegetation and changes in wildlife communities that are considered important to Native American tribal concerns. The cumulative projects could result in effects on cultural resources. The development of the Big Smoky Valley floor would result in a further modification of the viewshed from the identified TCPs; this would be a cumulatively adverse effect on an area identified as having traditional ecological knowledge. The overall cumulative development of the Big Smoky Valley would result in an adverse cumulative effect on resources identified as important to Native American concerns.

Cumulative impacts on historic properties under Alternative B would be consistent with those described above under the Proposed Action. Alternative B would contribute to adverse cumulative effects on cultural resources.

4.11 NOISE

4.11.1 Analysis Methods and Assumptions

This analysis addresses potential impacts on the acoustic environment from implementing the Proposed Action or alternatives described in **Chapter 2**. This analysis assumes the following:

- The BLM has no regulatory control over state and federal highway noise. Any noise generated from highways and interstates is not considered in the analysis.
- Other noise generators, such as humans, industry operations that are not part of the seven solar projects, and other ambient noises, are not considered in the analysis.
- Specific noise impacts from solar energy development may differ by project. Some noise impacts may be more localized, depending on the scale of the project.
- Impacts would be minimized through implementation of noise design features (see **Section B.9** of **Appendix B**).

Noise receptors occurring 1 to 2 miles outside the planning area (approximately 5,300–10,500 feet away) would likely experience noise levels that are comparable with current ambient noise conditions. As such, the analysis area for noise effects is the planning area plus a 2-mile buffer around this area.

The intensity of the effects would depend on the distance from the activity and on the receptors' sensitivity to the noise.

Impacts from noise are characterized by their effects on wildlife and the human environment. Impacts are most concentrated in places that are highly populated, highly sensitive to sound, or of disproportionate importance to people or wildlife. The planning area provides habitat for several species that are particularly susceptible to noise disturbance, including special status mammals, such as the pale kangaroo mouse and bighorn sheep, as well as migratory birds, especially during breeding and brood-rearing activities. Additional details regarding the noise impacts specific to wildlife are discussed in Section 4.1, Biological Resources, and in the Biological Resources Supplemental Environmental Report (BLM 2024d).

4.11.2 Alternative A. Proposed Action

Under the Proposed Action, the development of seven contiguous solar projects would increase the level of noise generated in the planning area, altering the acoustic environment. PV systems—the technology that would be used to create solar energy in the planning area—produce minimal noise during operations; however, higher levels of noise are produced during construction (Tawalbeh et al. 2021). Accordingly, the greatest impacts on the acoustic environment would be associated with equipment and vehicle use during the construction phase. Changes in the acoustic environment could also have impacts on the surrounding communities (see **Section 3.14**, Social Values, Economic Conditions, and Environmental Justice).

During construction, many pieces of heavy machinery and vehicles are used that generate noise, which is experienced by residents, recreationists and travelers, and wildlife in the planning area. In general, construction-related noise causes potential hazards to the workers and the ecosystem. Noise can also be generated from ongoing project maintenance, which would have long-term effects on wildlife and humans (Lovich and Ennen 2011). Such noise pollution could impact the workers' hearing ability and distract wildlife from their natural habitat. However, recent studies show that the noise produced during construction is a minor disturbance compared to that of transportation vehicles (Guerin 2017). Furthermore, in comparison with the construction of other renewable technologies, such as wind turbines and biomass systems, the noise generated from PV solar operations is minimal (Guerin 2017).

In addition, construction workers' use of the existing highway infrastructure to travel to and from the project area for solar energy development and maintenance would contribute to the region's acoustic environment. Using existing travel routes for construction purposes would contribute to short-term noise impacts, depending on the time of day and the scale of operations.

4.11.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, the impacts on the acoustic environment during construction and maintenance would be similar to those under the Proposed Action. Alternative B would introduce the utilization of mowing in 65 percent of the development area. This would contribute to additional noise and, specifically, increased dB levels. Lawn mowers typically produce noise levels between 90 and 95 dBs, which are above the average noise level of the example construction equipment described in **Table 4-5**, Example Construction Equipment Noise Levels (FHWA 2006).

4.11.4 Alternative C. No Action Alternative

Under the No Action Alternative the BLM would not amend the Tonopah RMP. Impacts on the acoustic environment would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, the acoustic environment would remain unchanged.

4.11.5 Cumulative Effects Analysis

The CESA for noise is the 10 miles from the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Past, present, and reasonably foreseeable future actions that have affected, and would continue to affect, noise in the CESA are as follows: large-scale utility projects; the Greenlink West and Western Bounty projects; transmission ROWs, one solar ROW, one road ROW, and one telephone ROW; and multiple current, future, and potential geothermal, solar, and mining projects (**Table 4-1**).

Large transmission line projects, such as the Greenlink West and Western Bounty projects, would cumulatively affect noise levels in and around the planning area. Noise would temporarily be generated from construction and maintenance of the proposed infrastructure. Such noise could cause wildlife disturbance and displacement from habitat. However, these impacts would be short term in nature. Potential ROW development could combine with the Proposed Action to produce additional noise.

Similarly, future geothermal, solar, and mining operations would further affect the acoustic environment by increasing the production of loud noises from construction, maintenance, and traffic.

Cumulative effects under Alternative B would be the same as those described under the Proposed Action.

Under the No Action Alternative, the BLM would not amend its RMP, in addition, future development could be constrained by the existing VRM classifications or slope requirements. As a result, noise related to the construction and maintenance of solar projects would not be produced.

4.12 Paleontological Resources

4.12.1 Analysis Methods and Assumptions

The analysis area for paleontological resources is the planning area. The indicators used in the analysis are the potential for damage, destruction, or removal of scientifically important fossils due to ground disturbance and increased access. In analyzing the impacts of the alternatives on paleontological resources, the best available scientific literature and GIS data were reviewed.

This analysis makes the following assumptions:

- Paleontological resources are nonrenewable, and impacts are typically permanent.
- Fieldwork, environmental compliance, and construction activities can lead to new discoveries and research opportunities.
- Scientifically important fossils are most likely to be discovered in those geological units currently classified as PFYC Class 4, 5, and U; however, they may be discovered throughout the analysis area.
- The design features for paleontological resources as identified in **Section B.10** of **Appendix B** will be incorporated into future actions, as appropriate; these would minimize impacts.

No direct impacts on significant paleontological resource locales have been identified. The current PFYC mapping does not assess the resource potential of geological units that are classified as unknown (PFYC U; see **Table 3-16**). As such, current available data provide a limited baseline for assessing the potential for impacts in these areas.

4.12.2 Alternative A. Proposed Action

Construction

Surface-disturbing activities involving excavation have the most potential for impacting paleontological resources. Excavations for construction would have direct, destructive impacts on paleontological resources; the very nature of excavation removes in place resources, potentially resulting in destruction of the resource or locality. These effects can be mitigated by recovering specimens and collecting data for future interpretation, as might be done during permitted scientific investigations.

Surface and near-surface exposures can also be impacted by shallower surface-disturbing activities, such as mowing, grading, and heavy equipment use. Shallowly buried paleontological resources can be exposed by natural erosion, which can be exacerbated by surface-disturbing activities. Surface exposure can lead to discovery of paleontological resources, but fossils can be damaged or lost by the direct action of ground disturbance, subsequent erosion, and unauthorized collection.

Impacts would be minimized through implementation of design features (see design feature PI-1 in **Appendix B**). This may include inventories and implementing mitigation measures that could include education of staff, construction monitoring, specimen recovery, or avoidance of known surface or subsurface formations. If excavation and removal are a prescribed mitigation, this can result in fossils being salvaged that may never have been unearthed as the result of natural processes. These would become available for scientific research, education, display, and preservation. Unmitigated surface-disturbing activities could dislodge or damage paleontological resources that were not known before.

Direct impacts related to construction include the damage or loss of paleontological resources from ground-disturbing activities. However, inventories or mitigation conducted in support of the projects would further the understanding of paleontological resources in the planning area.

Indirect impacts would also result from project activities, including the potential for increased erosion that would expose and affect the condition of paleontological resources. Increased access by workers in the planning area could increase the likelihood of impacts on paleontological resources from vandalism or unauthorized collection.

Operations and Maintenance

No direct impacts related to O&M would be anticipated. Indirect impacts would come from workers in the planning area increasing the likelihood of impacts on paleontological resources from vandalism or unauthorized collection.

Decommissioning

Direct impacts related to decommissioning include the damage or loss of paleontological resources from ground-disturbing activities. These would be similar in nature to those impacts during construction; however, they likely would be a much smaller degree since the activities would take place in previously disturbed areas.

Indirect impacts from vandalism or unauthorized collection due to increased access would be anticipated and would end after decommissioning is complete.

4.12.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, the effects on paleontological resources would be very similar to the effects described under the Proposed Action. However, measures intended to conserve intact soils and vegetation, specifically limiting the amount of construction grading to 35 percent of the proposed development area, would limit surface disturbance and the related impacts to a greater degree than Alternatives A and B.

4.12.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP, in addition, future development could be constrained by the existing VRM classifications or slope requirements. There would be no changes in the potential for direct or indirect impacts on paleontological resources as a result of the Proposed Action or Alternative B. Existing regulatory protections and requirements related to paleontological resources would remain in place. Current conditions and trends related to collection and natural processes, such as erosion, would continue as described in the affected environment.

4.12.5 Cumulative Effects Analysis

The CESA for paleontological resources is the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). Past, present, and reasonably foreseeable future actions that have and would continue to affect paleontological resources include mineral exploration and development, renewable energy development, recreation, travel management, and utility projects (**Table 4-2**). Activities related to these actions have and would continue to create ground disturbance and increases in access that could impact paleontological resources in the planning area.

Construction, O&M, and decommissioning of the proposed solar energy projects would contribute to the accumulation of impacts on paleontological resources in the planning area through a variety of ground-disturbing activities and increases in access related to their development. Design features and mitigations that would be incorporated into future projects, as required by regulations, would reduce the anticipated adverse impacts, providing the opportunity for preservation and further study of any significant paleontological resources discovered as a result.

When combined with these past, present, and reasonably foreseeable future actions, Alternatives A and B would contribute to cumulative effects from ground disturbance and access in the planning area to a greater degree than Alternative C (the No Action Alternative). Alternative B would limit impacts related to surface disturbance and the associated erosion to a greater degree than Alternative A.

4.13 RANGELAND – GRAZING MANAGEMENT

4.13.1 Analysis Methods and Assumptions

This analysis addresses potential impacts on livestock grazing from implementing the Proposed Action and alternatives. This analysis assumes the following:

- All existing leases and permits would be subject to terms and conditions by the BLM Authorized Officer, as established by BLM regulations.
- Livestock grazing on BLM-administered land is tied to permittee-owned or controlled base property on private lands.
- The AUMs listed in this analysis are for the entire allotment, not the portion of the allotment within the planning area.

4.13.2 Alternative A. Proposed Action

Under the Proposed Action, the BLM would make the planning area more available for solar projects, which by itself would not affect grazing permits. If the BLM authorized some or all of the proposed projects it is expected a reduction of available AUMs. Reducing the AUMs could have a negative economic impact on the operator, permittee, or lessee, as well as the surrounding communities as a whole (see **Section 3.14**, Social Values, Economic Conditions, and Environmental Justice).

During construction, there could be degradation to grazing lands caused by human influences like vehicle use and construction activities. While the bulk of the construction would occur in areas closed to livestock grazing, there would still be traffic and human activities going in and out of the planning area and crossing grazing lands; however, access to existing wells and range improvements would not be impacted. Traffic and human activities can spread noxious weeds and thus decrease forage quality and increase the potential for wildfires. There could also be an increase in livestock injury or death due to vehicular collisions and other activities associated with development. However, implementing design features (**Appendix B**) to minimize impacts on livestock (see design feature RG1-1) and to create livestock friendly roads (see design feature RG2-1) would reduce impacts on livestock and grazing operations.

4.13.3 Alternative B. Soils and Vegetation Conservation Alternative

Impacts on rangeland and livestock grazing management would be similar as those described under the Proposed Action. There would be the potential for more forage availability under this alternative; this is because the traditional construction grading methods would be limited. However, because most construction would occur in areas where livestock grazing is not allowed, livestock would not utilize the additional forage.

4.13.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM wound not amend the Tonopah RMP. In addition, the solar field, gen-tie line, energy storage system, and associated linear facilities would not be developed until further NEPA analysis is conducted and individual projects are approved. Therefore, no changes or alterations to the landscape would result. There would be no impacts on grazing permits.

4.13.5 Cumulative Effects Analysis

The CESA for rangeland and grazing management is the total area contained within the three grazing allotments that overlap the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Cumulative impacts may result from activities on adjacent BLM-administered lands, as well as lands under other ownerships from other resource use activities. Livestock grazing management is broadly consistent across federal landownership due to adherence with current federal laws, regulations, and policies. Past, present, and reasonably foreseeable future actions for rangeland and grazing management include various ROWs.

Past and present actions, such as the Greenlink West project, Ormat Nevada transmission lines, solar ROWs, geothermal leases, and mining, have impacted a minimum of 1,560 to 3,850 acres within the CESA (**Table 4-2**). Impacts would include removal of forage from development and potential actions to restore the disturbance after development. The Proposed Action would contribute to cumulative effects in the short term due to the disturbance associated with the development of the solar projects. The increased potential for disturbance and soil compaction could decrease forage availability as access roads for these projects are built through the grazing allotments. The spread of noxious weeds through human activity could spread throughout the allotments and decrease forage quality outside the planning area; without proper restoration activities, noxious weeds could spread farther in the coming years.

4.14 Recreation

4.14.1 Analysis Methods and Assumptions

The area of analysis for recreation is the planning area. Indicators related to recreation are changes in the recreational setting, recreational experiences, and opportunities for recreation. Recreation design features (see **Section B.12** of **Appendix B**) would be implemented to minimize impacts on these uses.

4.14.2 Alternative A. Proposed Action

Under the Proposed Action, the development of the seven solar projects would displace opportunities for recreation. The Proposed Action would displace recreation in the planning area where currently undeveloped lands would be developed. Recreation in the surrounding mountain ranges would still be available. However, views of the valley from the surrounding mountain ranges would be degraded because of surface disturbances, new infrastructure, and the loss of vegetation associated with the Proposed Action, thereby diminishing the recreational setting in the long term.

All existing routes that overlap the planning area would be maintained. As a result, there would be no change in public access to any recreational opportunities, such as the surrounding mountain ranges. Also, the Proposed Action would not conflict directly with the Casey Folks Vegas to Reno Race because existing routes used for the race would be maintained. Though fencing would be installed around project areas, all solar projects would provide access to existing routes and allow space for access to the SRP route to continue. However, the recreational experience of participating in or spectating the race would change due to new infrastructure impacting the visual setting of this section of the race.

During construction, traffic could temporarily increase on US Highway 95 and Nevada SR 265, though neither roadway would be closed. Traffic delays could impact the recreational experience by causing delays in access to recreational areas for those traveling through the planning area. However, several measures would be taken to control public access and to maintain public safety, including the use of informational signs, flaggers, and traffic cones to identify any necessary temporary changes in lane configuration.

During construction, increases in human activity and related noise and traffic would change the recreational setting of the planning area and surrounding lands with recreational values by decreasing the sense of solitude. Construction activity and noise could displace big game species that travel through the area, which could decrease populations available for hunting in the adjacent mountain ranges. These impacts are expected to be short term, assuming big game species return after construction. The result of these changes could make recreation in the locations within and surrounding the planning area less appealing.

4.14.3 Alternative B. Soils and Vegetation Conservation Alternative

The impacts on recreation under Alternative B would be similar to those described above under the Proposed Action. Applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Mowing would be utilized in the rest of the development area to leave vegetation intact. This would minimize surface disturbances and maintain vegetation, both of which maintain the natural landscape viewed and experienced during recreation, resulting in fewer impacts on the recreational setting.

4.14.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP. Impacts on recreation under the No Action Alternative at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved there would be no new development and recreational use would remain unchanged.

4.14.5 Cumulative Effects Analysis

The CESA for recreation includes the area 10 miles out from the planning area. It encompasses some private land as well as federal lands (**Figure 4-1**, **Table 4-1**, **Appendix A**). The timescale for the cumulative analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance and climatic conditions.

Past, present, and reasonably foreseeable future actions that affect recreation in the CESA include the following: the Nevada Multi-District Off-Highway Vehicle Special Recreation Permit Programmatic Environmental Assessment and the Casey Folks Vegas to Reno Race; two large transmission line projects (Greenlink West and Western Bounty); three transmission ROWs (one solar ROW, one road ROW, and one telephone ROW); and multiple current, future, and potential geothermal, solar, and mining projects (**Table 4-2**).

The BLM is preparing a programmatic environmental assessment to cover a range of SRPs for OHV events in Nevada, including events that pass through the planning area, such as the Casey Folks Vegas to Reno Race. The programmatic environmental assessment would define routes, but the number of SRPs issued are expected to remain stable. It also would establish a set of standard stipulations and mitigation measures to be applied to all events on the given routes (BLM 2023). This would likely influence the recreational settings, experiences, and opportunities.

Large transmission line projects, including the Greenlink West and Western Bounty projects, would affect recreational opportunities in and around the planning area by displacing and limiting access during construction. Potential ROW development could remove access to BLM-administered lands, reducing recreational opportunities. Nearby future geothermal, solar, and mining operations would also remove BLM-administered lands for recreational use and limit locations available for remote recreational experiences.

4.15 SOCIAL VALUES, ECONOMIC CONDITIONS, AND ENVIRONMENTAL JUSTICE

This section describes the potential impacts on social values, economic conditions, and EJ from the Proposed Action, the Soils and Vegetation Conservation Alternative, and the No Action Alternative. The analysis summarizes the findings from the Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report (BLM 2024g).

The analysis assumes the required design features outlined in **Section B.13** of **Appendix B** would be implemented to avoid, reduce, or otherwise offset impacts. The direct and indirect effects described below are those that could occur after implementing the measures, as applicable.

4.15.1 Analysis Methods and Assumptions

Quantitative Computational Modeling of Effects on Economic Conditions

The assessment of economic impacts used representative data from the seven proposed solar development projects to estimate the direct impacts of the solar facilities. These data cover employment for project construction. **Table 4-8**, below, summarizes the estimated construction workforce for each project in the planning area.

Table 4-8. Estimated Construction Workforce by Project

Project	Description	Estimated Construction Workforce Size (# of Workers)[a]
Lone Mountain Solar	1,000 MW PV and 500 MW battery storage; 8,350 acres	600
Nivloc Solar	500 MW PV and battery storage system; 8,280 acres	225
Smoky Valley Solar	1 GW PV and battery storage system; 4,890 acres	300
Red Ridge 1 Solar Red Ridge 2 Solar	600 MW PV and battery storage system; 6,190 and 6,860 acres, respectively	1,000 1,000
Esmeralda Energy Center	1 GW PV and battery storage system; 8,360 acres	400
Gold Dust Solar	1.5 GW PV and 1 GW battery storage; 16,720 acres	700
—	—	**4,225 (Total)**

Sources: 335ES 8me LLC 2021a; 336SP 8me LLC 2021b; Boulevard Associates LLC 2021; CG Western Renewables III LLC 2021; Gold Dust Solar LLC 2021; Nivloc Solar Energy LLC 2021; US Solar Assets 2021. Additional/updated estimates were submitted to the BLM by project applicants in July 2023.
[a] Full-time equivalent. Peak workforce numbers may be higher than the estimates provided.

These data sources were used to estimate impacts from the project construction phases on employment and income. The Impact Analysis for Planning (IMPLAN) model, a regional economic impact model, was utilized to estimate the indirect impacts of each solar project development within the planning area both individually and cumulatively on economic conditions in the six-county area comprising the SSA. IMPLAN provides a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services.

The modeling analysis was used to estimate economic contributions from the Proposed Action; these contributions are defined as the gross changes in a region's existing economy that can be attributed to an event, which in this case is the construction of the seven proposed solar projects. For activities that generate measurable spending, such as the construction phases associated with the projects, the model estimates economic contributions in terms of output (total spending), value added (gross output minus intermediate inputs), labor income (employee compensation, including wages, benefits, and proprietor income), and employment in the regional economy. Through the use of a regional input-output multiplier (that is, IMPLAN), an assessment of impacts on selected industrial sectors of the economy is evaluated. IMPLAN provides a mathematical account of the flow of dollars and commodities through a region's economy. This model provides estimates of how a given amount of a particular economic activity translates into jobs and income in the region.

Economic impacts are described in terms of direct, indirect, and induced impacts. Direct impacts, such as income and employment, are directly affected by business activities, such as construction, on BLM-administered land. Indirect impacts represent local industries buying goods and services from other local industries (such as a construction firm purchasing supplies locally). Induced impacts are the results of spending by employees hired due to these business activities (for example, workers at a construction firm purchasing food at a local grocery store). Together, these are reported as the total impact of the various alternatives.

Employment opportunities related to activities on BLM-administered land include jobs in retail, transportation, accommodations, and various other commercial activities. The economic analysis provides quantitative estimates of employment in the planning area. For all economic modeling presented here, data presented are estimates based on best available data. Actual jobs, income, and economic output would vary based on site-specific differences and changes in market demand for solar resources or various other factors that could alter the economic contributions.

It was assumed that roughly 50 percent of the construction workforce would come from outside the SSA (from the Las Vegas or Southern California area) and that construction timing would be staggered among the projects to allow for the workforce to be shared among the separate developments. Economic multipliers for data year 2023 for various energy, manufacturing, and service sectors and personal consumption expenditures provided by the IMPLAN model captured the indirect (off-site) effects of the construction of the solar facilities.

Qualitative Analysis of Effects on Market and Nonmarket Values

Effects on market and nonmarket values are analyzed in the framework of ecosystem services. These represent goods and services that an ecosystem provides for human use. Impacts on ecosystem services from solar development activities would include potential impacts on provisioning services[36] of minerals and water; regulating services, such as maintenance of water and air quality; supporting services of habitat for wildlife; and information services related to aesthetic values and recreational opportunities.

4.15.2 Impacts on Social and Economic Conditions

Alternative A. Proposed Action

Modeled Impacts on Economic Conditions

The effects on economic conditions within the SSA were modeled based on the estimated workforce requirements, the results are presented in **Table 4-9** and reflect annual (over an assumed 5-year total construction time frame) direct, indirect, and induced[37] economic contributions to employment, labor income, and value added.[38] Total employment effects represent employment in all sectors in the regional economy, including, but not limited to, the construction industry, that would be supported by the employment directly related to the projects.

Contributions from the projects on direct labor income would be approximately $65 million annually over the 5-year time frame, while total labor income (including direct, indirect, and induced) would be approximately $78 million annually. Total employment would be an estimated 1,109 jobs, and total value

[36] Provisioning services are the products directly obtained from ecosystems for basic human needs (for example, food, water, minerals, shelter, and fuel).

[37] Induced effects are the values stemming from household spending of labor income, after removal of taxes, savings, and commuter income. The induced effects are generated by the employees' spending within the businesses' supply chain.

[38] Value added is equivalent to the industry's contribution to the gross domestic product. It represents the difference between output and the cost of intermediate inputs throughout a defined economy during a specified time period. It equals gross output (sales or receipts and other operating income, plus inventory change) minus intermediate inputs (consumption of goods and services purchased from other industries or imported).

Table 4-9. Average Annual Economic Effects – Alternative A (2023$)

Impact Type	Employment	Labor Income (in $1,000)	Value Added (in $1,000)
Direct effect	845	65,354	135,547
Indirect effect	127	6,867	12,835
Induced effect	138	5,874	13,724
Total effect	**1,109**	**78,095**	**162,105**

Source: IMPLAN 2023

added would be approximately $162 million.[39] The timelines for construction would vary by project with estimates of 18 to 36 months. The timing of project approvals and the availability of the construction contractors and workforce would also differ by project. It is assumed that full buildout of all projects could be completed within 5 years from the ROD for the PEIS/RMPA.

Impacts on Market and Nonmarket Values

The potential for localized impacts on quality-of-life indicators due to solar development could occur and would depend on the level of development. Such impacts could result in changes to resource conditions, such as water resources, the visual setting, and traffic. In addition, an area's social setting could be affected as a result of an influx of population, which affects the existing traditional or cultural setting. Those who prioritize resource conservation could also experience development impacts on values such as open space, the viewshed, and recreational opportunities.

BLM management actions that change development levels or have population growth-inducing effects could change the social setting and nonmarket contributions for communities. Large-scale solar development under the Proposed Action could impact adjacent land uses and possibly affect habitat for sensitive species. Similarly, development would impact the local traffic, noise, visual setting, and air quality. All these factors could impact local residents' quality of life.

Effects on the social setting would include those related to changes in the visual landscape, whereby scenic views from SR 265 or Emigrant Pass Road would be reduced. This would adversely affect one component of quality of life for some local residents. Similarly, increased noise, traffic and visible dust from activities occurring on the landscape would contrast with the current setting. In addition, the potential for increased law enforcement presence and emergency services personnel during and following the construction period, particularly in Esmeralda County and in the Tonopah area of Nye County, would affect these quality-of-life indicators, although effects would be more notable during the construction phases of solar development. Due to the low impact of facility operations during the solar power production phase, the effects would be reduced over time.

Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, the effects on economic conditions within the SSA would be substantially similar to the effects described under the Proposed Action.

[39] This contribution represents roughly 4 percent of the combined gross domestic product for the six-county SSA (BEA 2021).

Alternative C. 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 until further NEPA analysis is conducted and individual projects area approved. Therefore, there would be no effects on social values and economic conditions in the SSA. Existing conditions in the SSA would continue and the BLM would not amend the Tonopah RMP.

4.15.3 Impacts on Environmental Justice Communities

All Action Alternatives

Under both action alternatives, impacts on EJ populations could include long-term impacts on the visual setting, impacts on air quality and climate change, increased noise, increased traffic from solar development activities, and potential changes to the area's social setting, if the population demographics change because of development. Should a sudden influx of transient workers be needed to support solar development, EJ populations could be impacted. Small, rural communities such as Dyer, Goldfield, Hawthorne, and Tonopah would most likely be the main recipients of the influx. An increase in transient workers could make housing less available or less affordable in these areas; a decrease in housing availability could disproportionally affect low-income families if housing costs (such as property taxes and rents) rise as a share of their income more than they rise for the rest of the population.

In addition, impacts on low-income families could occur in areas with decreased housing vacancies due to the need to accommodate the construction workforce required for the projects' development. In these areas, travel time to work and the associated travel costs for low-income families could increase, if they are displaced by the need for a large supply of short-term labor. Consequently, disproportionate impacts on EJ populations would be possible. As described in **Section 4.14.4**, Cumulative Effects, the magnitude of impacts on affordable housing would depend on the timing and intensity of the proposed solar development activities and the degree to which they would occur simultaneously with other reasonably foreseeable projects in the area, such as the Greenlink West project.

The extent to which existing EJ populations would be disproportionately affected by high and adverse human health or environmental impacts depends on whether EJ populations would be more likely to be exposed to such impacts or would be more vulnerable to them. The location of project features and their proximity to potential EJ populations are not currently known. It is assumed, however, that no notable sources of hazardous materials or toxic air releases would be produced during either the construction or the operation phases of the projects.

Alternative C. 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 until further NEPA analysis is conducted and individual projects area approved. Therefore, there would be no effects on EJ populations in the SSA. Existing conditions in the SSA would continue and the BLM would not amend the Tonopah RMP.

4.15.4 Cumulative Effects Analysis

The CESA for social values, economic conditions, and EJ is the SSA, which includes potentially affected counties based on the demand for labor and temporary housing and services (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant.

Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Past and present actions within the cumulative assessment boundary include dispersed recreation (such as off-road vehicle use and races and hunting), developed recreation, community development, livestock grazing, mining operations, minerals exploration, geothermal exploration and development, solar ROWs and development, and ROWs for roads and utilities. The BLM has identified past, present, and reasonably foreseeable future actions (**Table 4-10**) that overlap both spatially and temporally with the Proposed Action and the alternatives on BLM-administered lands in the CESA, and thus are relevant for analyses.

Table 4-10. Reasonably Foreseeable Future Actions

Reasonably Foreseeable Action	Brief Description of Action	Size (acres unless noted)
Greenlink West/NV Energy	NV Energy has proposed a system of new 525, 345, and 120 kV electric transmission facilities on private, state, and federal lands between northern and southern Nevada. The project will run from Las Vegas to Reno through Clark, Nye, Esmeralda, Mineral, Lyon, Storey, and Washoe Counties.	1,860 (including a 200-foot buffer along an 80-mile corridor)
Western Bounty/Gallatin Power	Gallatin Power has proposed a direct current transmission line.	9,200 (including a 250-foot buffer and three segments crossing 150 miles)
Ioneer USA Corporation	The proposed Rhyolite Ridge Lithium-Boron Mining Project is in Esmeralda County. Ioneer submitted its initial plan of operations in August 2022 and expects to receive a ROD in 2024.	7,166
Sierra Pacific Power Company	Transmission ROW	59.6
Ormat Nevada	Transmission ROW	1,418
Sierra Pacific Power Company	Transmission ROW	178.4
Valley Electric Associates Inc	Transmission ROW	267.85
Sierra Pacific Power Company	Transmission ROW	124.12
Sierra Pacific Power Company	Transmission ROW	610.9
US Department of Energy	Transmission ROW	756.58
Mt. Wheeler Power	Transmission ROW	397
Sierra Pacific Power Company	Transmission ROW	4,332.81
Los Angeles Department of Water and Power	Transmission ROW	4,173.76
Sierra Pacific Power Company	Transmission ROW	4,900
Gridliance West LLC	Transmission ROW	192.9
Sierra Pacific Power Company	Transmission ROW	300
Bonanza Peak Solar LLC	Transmission ROW	178.4
American Glory	Solar ROW	6,921
Ormat Nevada	Geothermal lease	5,078
Baseload Power US Holdings	Geothermal lease	4,884
Ram Power	Geothermal lease	40,092
Various	Geothermal leases and utilizations sites	3,611

Reasonably Foreseeable Action	Brief Description of Action	Size (acres unless noted)
Vegas to Reno OHV SRP	Best in the Desert Vegas to Reno desert OHV race. The event is held on public lands managed by the BLM Tonopah, Stillwater, and Sierra Front Field Offices. The event covers approximately 521 miles. The race occurs on 1 day, but public access to the race area may be impeded by race use for 2 days (the day of the race and the prior day).	340 miles
Naturgy Candela Devco	Solar development	5,725
Vanderbilt Minerals LLC	Road ROW	8.5
AT&T	Telephone ROW	797.8
Valley Electric	Telephone/communication ROW	170
Department of Energy	ROW	16,291
Rulco LLC	Potassium prospect	2,534
Global Silica	Mining	540
Allegiant Gold	Mining	300
Various	Mining plans and exploration	35,936
American Battery Technology Company	Lithium mining	10,340
Kinross Gold	Hard-rock mining and exploration	7,673
Authium LLC	Hard-rock mining and exploration	100
Neolith Energy	Lithium mining	1,280
Centrestone Resources LLC	Mining	1,295
Allegiant Gold	Mining	300
Authium LLC	Hard-rock mining and exploration	100

Source: BLM GIS 2023

The above-listed past, present, and reasonably foreseeable future actions have affected, and would continue to affect, social values, economic conditions, and EJ communities in the CESA. Most notably, increasing development pressure driven by demand for minerals, particularly lithium, is reasonably foreseeable during the planning period. However, the extent to which these developments will drive local and regional demand for labor is currently speculative. Detailed analyses of potential economic impacts would occur at the time of specific development proposals; they are not possible at this time. However, it can be assumed that economic impacts from employment, labor income, economic output, and social setting changes could be compounded when considered in the context of these other forces, particularly if the construction time frames of these other larger developments were to coincide with that of the current projects. Once detailed proposals for development of locatable minerals on BLM-administered lands are received, specific analyses of impacts on EJ populations would be evaluated as part of the NEPA process associated with those development proposals.

Energy development within existing transmission corridors, such as the approximately 350-mile, 525 kV Greenlink West project, is anticipated to drive further local and regional renewable energy development. The magnitude of impacts on affordable housing would depend on the timing and intensity of the proposed solar development activities, and the degree to which they would occur simultaneously with other reasonably foreseeable projects in the area, such as the Greenlink West project.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action and the alternatives would contribute incrementally to adverse cumulative effects on socioeconomics and EJ communities in the SSA. Implementing the required design features and avoidance, minimization, or mitigation measures identified in **Appendix B** to minimize potential socioeconomic impacts (see design feature S1-1 (a)), including developing a community monitoring program that would be sufficient to identify and evaluate socioeconomic impacts resulting from solar energy development, would minimize,, but not completely avoid, the alternatives' contribution to the cumulative effects.

4.16 SOILS

4.16.1 Analysis Methods and Assumptions

Soil map units were downloaded from the NRCS soil survey geographic database from the Version 18 Esmerlda County Area, Nevada soil survey (NRCS 2023a, 2023b) and clipped to the project area using GIS. Slopes were calculated in GIS using a digital elevation model. This information was used to quantify acres of potentially erodible soils, slopes, and farmlands in the planning area. The online, interactive version of the NRCS soil survey geographic database, Web Soil Survey, was used to summarize general information about the soils in the planning area, including dominant soil orders and general horizon characteristics, and the soil reclamation potential (NRCS 2023a). Biological and physical crusts were analyzed qualitatively.

Short-term impacts on soils would occur during the construction period and during decommissioning. Long-term impacts on soils would occur during O&M of the proposed infrastructure and ancillary systems and after decommissioning, after the soils are reclaimed.

The soils analysis uses the following assumptions:

- Soils rated as WEG 1 or 2 and soils with moderate or high Kw factor ratings would be the most vulnerable to surface disturbance and would have the greatest soil erosion potential.
- Biological soil crusts and physical crusts have not been inventoried in the planning area, but they have the potential to occur.
- Surface disturbance from the activities under the Proposed Action could occur on any of the soil map units identified.

Reclamation activities would coincide with BMPs and would depend on soil resiliency, which is the soil's inherent ability to recover from impacts. In cases where soil is completely lost, soil reclamation would not be possible.

4.16.2 Alternative A. Proposed Action

Under the Proposed Action, an RMPA would be required to allow for construction of solar facilities on lands with slopes greater than 5 percent. This area represents approximately 320 acres, or 0.5 percent, of the planning area (BLM GIS 2023). Soils on slopes greater than 5 percent would be more susceptible to erosion from surface disturbance than those on slopes less than 5 percent.

Where soils are graded and leveled for the placement of infrastructure and ancillary systems, the topsoil would be removed so that only the bare mineral soil would remain, and the mineral soil would be compacted. Operation of vehicles within the planning area during construction, operation, and decommissioning would decrease soil porosity, reduce water infiltration, and displace surface soil particles. In turn, the potential for erosion would increase, especially for soils in WEGs 1 and 2 and soils with moderate or high Kw factor ratings. The soil map units associated with these ratings are described in the affected environment. Impervious surfaces and unpaved, unvegetated areas would increase once the

Esmeralda 7 projects are fully built out. Changes in site conditions from pervious and vegetated areas to impervious and unvegetated areas would result in increased stormwater runoff via overland flow, which could redirect surface flows, resulting in increased erosion in both on-site and off-site areas.

The most severe impacts on soils would occur during the construction period, during which the most vehicle use would occur. Once the facilities are constructed, including access roads, the surface disturbance from the workforce vehicles during O&M activities would be less severe. The use of existing roads to reduce new disturbance would minimize surface disturbance from construction equipment on undisturbed soils and reduce the potential for soil erosion, especially for soils in WEGs 1 and 2 and soils with moderate or high Kw factor ratings. In addition, dust-control project design features, such as the application of gravel on dust-prone areas, would reduce wind erosion.

Heavy equipment and repeated vehicle use over the same areas would increase the potential for compaction (Taghavifar and Mardani 2014), and wet soils would be the most vulnerable (NRCS 2017). Project design features, including the application of gravel on muddy areas and the use of wide-tracked or balloon-tired equipment, would be implemented to avoid compaction on wet soils.

Surface disturbance from vehicle use on biological soil crusts would decrease the abundance of biological communities and reduce the crusts' function to provide soil stability. This would indirectly increase the potential for soil erosion. The time it takes for organisms to recover would depend on the biological composition of the crust; cyanobacteria recover faster than moss and lichen after physical disturbance (Belnap et al. 2001). In contrast, surface disturbance on physical soil crusts would increase their porosity and water infiltration.

The 101—Unsel-Wardenot-Izo association, 310—Gynelle-Oricto association, and 470—Ardivey-Unsel-Wardenot association soil map units make up most (15.8, 30.8, and 18.0 percent, respectively) of the planning area and would have the greatest potential for impacts. These map units have low Kw values, meaning they are less susceptible to water erosion. Map units 101 and 470 are rated as WEG 6 and would have less potential to be eroded by wind after surface disturbance. Map unit 310 is rated as WEG 2 and would have greater potential to be eroded by wind after surface disturbance.

The soil map units (311—Gynelle-Cirac association and 455—Cirac-Kawich association) classified as farmlands of statewide importance, if irrigated, overlap the Nivloc Solar, Gold Dust Solar, and Lone Mountain Solar project areas. Surface disturbance on these map units could reduce the fertility of these soils and their potential to produce crops in the long term. It is not anticipated that the soil fertility and productivity would reduce such that the soil map units can no longer be classified as farmlands of statewide importance, if irrigated.

As described in the affected environment, all soils in the planning area are rated as "poor" for reclamation potential and for topsoil quality. Organic matter amendments, which would increase the water-holding capacity and aggregate stability of the soil (Weil and Brady 2019), could be necessary before the soil could be used for reclamation. Where soil was previously compacted, tilling could be necessary to loosen the soil. Under the project design features, this would occur for compacted soils in temporary use areas. This would increase the porosity and the capacity for water infiltration. After the topsoil is replaced, calcium amendments and artificial drainage and irrigation may also be required to promote leaching of the undesirable salts (NRCS 2009). Reseeding would reestablish vegetation cover within a few years, which would promote soil aggregate stability and minimize the erosion potential.

4.16.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, development would only be allowed where it meets the criteria stated under **Section 2.3**; otherwise, development would not be allowed on areas with slopes greater than 10 percent. Most development under Alternative B would occur on slopes less than 5 percent. This would decrease the potential for soil erosion. If the areas with slopes between 6 and 10 percent meet the 2012 Solar RMPA slope criteria, development on these areas would increase the potential for soil erosion. However, these effects would be minimal because they would only include up to 270 acres (0.4 percent) of the planning area.

Compared with the other action alternative, utilization of mowing methods for 65 percent of the proposed development area under Alternative B would decrease vegetation and topsoil removal and soil compaction. This would decrease the potential for soil erosion, especially for soils in WEGs 1 and 2 and soils with moderate or high Kw factor ratings. If mowing is used instead of grading where farmlands of statewide importance and biological soil crusts occur, surface disturbance on these areas would decrease, compared with the other action alternative. This would reduce the potential for decreased microbial abundance in biological soil crust communities and reduce the potential for decreased soil productivity on farmlands. Mowing would likely not break apart physical soil crusts; these areas would continue to have poor porosity. Where traditional construction grading methods are used (at a maximum of 35 percent of the proposed development area), direct and indirect impacts on soils would be the same as those described under the Proposed Action.

Project design features, as described in **Section B.14** of **Appendix B**, would be most effective under Alternative B because there would be less surface disturbance from grading, and disturbance on slopes greater than 5 percent would be minimized or avoided.

4.16.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. Impacts on soils resources would not occur at the levels or timeframes described under the Proposed Action. Until additional analysis is completed, and projects are approved, soils trends and current impacts from activities such as grazing and off-road recreation would continue.

4.16.5 Cumulative Effects Analysis

The CESA for soils is the 12-digit HUC sub-watersheds that overlap the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions. Cumulative effects that result in soil loss would be permanent effects.

Past, present, and reasonably foreseeable future actions (**Table 4-2**) that have affected, and would continue to affect, soils in the CESA are as follows: ROWs for energy transmission, energy generation, minerals exploration and development, and roadways. Construction, operation, and maintenance of most of these actions have removed vegetation, disturbed biological soil crusts, and compacted and displaced soils. These impacts, which decrease soil stability and infiltration capacity, and increase the potential for soil erosion, would continue in the CESA.

Construction of the utility-scale solar energy projects would remove topsoil and compact mineral soils within the facilities' footprints during land-clearing and land-grading operations. The primary potential impacts associated with these operations would be compaction and soil loss. If site grading alters the surface drainage patterns, the site's surface runoff and soil moisture characteristics would also change. This would result in areas that are more or less vulnerable to erosion, depending on existing site-specific conditions and inherent soil properties, including soil texture and slope.

When combined with these past, present, and reasonably foreseeable future actions, the Proposed Action would contribute to soil displacement and sedimentation within the CESA. Implementing the design features and BMPs identified in **Section B.14** of **Appendix B** would minimize, but not completely avoid, the alternative's contribution to the cumulative effects.

Cumulative effects on soils under Alternative B would be similar to those described under the Proposed Action. However, there would be less cumulative effects from topsoil and vegetation removal, and the potential for changes to surface drainage patterns would decrease. Overall, the potential for erosion would decrease compared with the Proposed Action. This is because there would be less surface disturbance on soils from grading, and disturbance on slopes greater than 5 percent would be minimized or avoided.

There would be no cumulative impacts on soils under the No Action Alternative.

4.17 Transportation, Access, and Public Safety

4.17.1 Analysis Methods and Assumptions

The study area for transportation, access, and public safety is the planning area. The transportation, access, and public safety analysis uses the following indicators: (1) an increase or decrease in traffic, (2) changes to access, and (3) public safety concerns from solar development. The analysis uses the following assumptions:

- All construction workers would use SR 265 to ingress and egress to and from the planning area.
- Solar development applicants would implement all programmatic design features, including conducting a study to accurately assess and quantify potential glinting and glare effects (see design feature VR2-1 in **Section B.16.2** of **Appendix B**).

4.17.2 Alternative A. Proposed Action

During the 5-year construction period, traffic would temporarily increase on US Highway 6/95 and on SR 265. The greatest impact would be at the intersection of SR 265 with US Highway 6/95, where most of the construction trucks and vehicles would ingress and egress.

Impacts on the communities within the 90-minute commute area from construction traffic to and from the planning area are discussed further in the Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report (BLM 2024g).

Access along SR 265 would be delayed, but not restricted, if flaggers stop vehicles to allow construction trucks to ingress or egress. There would also be an increase in vehicle encounters at flagging points along SR 265. As described in **Section 4.5**, Hydrologic Resources, there would be approximately 102 vehicle trips per day on SR 265 to deliver water needed for O&M activities. This would approximately double the average daily traffic on SR 265 (see **Table 3-27**). Resulting delays from the increased traffic on SR 265 would not significantly affect free-flowing conditions, but they could increase vehicle encounters and the potential for vehicle collisions.

To prepare for hazards that could result from increased truck traffic, the applicants would be required to control traffic hazards using a management plan for site access roads. The plan would also identify specific issues of concern, such as locations of bus stop routes and stops. The plan would incorporate measures to maintain public safety, including the use of informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.

Fencing used to mark the perimeters of the Esmeralda 7 projects would include gaps for access roads. Therefore, public access to designated access roads would not be restricted under the Proposed Action. Impacts on recreation users are described in detail in **Section 4.13**, Recreation.

Development activities associated with site characterization, construction, operation, and decommissioning of a renewable energy project would potentially raise health and safety concerns for construction workers. Applicants would minimize these impacts by creating a health and safety program that would be developed to protect workers during these phases. The applicants would also develop a health and safety program that would ensure compliance with Occupational Safety and Health Administration standard practices for explosives and blasting agents, measures for reducing occupational electromagnetic field exposures, and required safety performance standards. The program would also establish fire safety evacuation procedures. These practices would reduce or minimize the health and safety concerns for construction workers associated with the solar development projects.

Various construction activities would have the potential to cause human-caused fire, including operating heavy machinery in vegetated areas. Applicants would be required to develop a fire management and protection plan to implement measures to minimize human-caused or natural fires.

The proposed solar projects would also have the potential to cause adverse impacts on nearby residences and motorists on SR 265 from noise, sun reflection, flicker, or electromagnetic fields. To reduce the impacts of these health and safety concerns on nearby residences and passing motorists, the applicants would incorporate recommendations for addressing these concerns into the project design to mitigate transmission line and substation interference with local structures. Applicants would also design their respective projects to reduce electromagnetic interference and to comply with Federal Communications Commission regulations. This would include reducing the potential or real interference with public safety-related communication systems, such as reducing radio traffic related to traffic emergencies. Solar glare from the PV panels cannot be completely avoided. Several factors, including the angle of the sun and reflected light from the PV panels, the time of day and season of the year, and the orientation of the PV panels as seen from an observation point, can influence the effect of solar glare on residences and motorists (Rose and Wallert 2015; Guo et al. 2023). Once the PV panels are installed, solar glare would be a potential driving hazard for motorists driving on SR 265.

Additionally, dielectric fluids could include SF_6, which has a high global warming potential (or the measure of infrared thermal radiation that a GHG would absorb over a given time frame). Applicants would consider the use of alternative dielectric fluids or would be required to regularly conduct leak detection inspection to minimize impacts from SF_6.

Finally, applicants would also be required to install meteorological towers for site monitoring and testing; these towers would be inspected periodically for structural integrity.

4.17.3 Alternative B. Soils and Vegetation Conservation Alternative

The slope and vegetation conservation requirements under Alternative B would not affect the number of vehicles on the road or other factors that impact transportation, access, or public safety. Therefore, the impacts under Alternative B would be the same as those described under the Proposed Action.

4.17.4 Alternative C. No Action Alternative

Under the No Action Alternative, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. Until additional analysis is completed, and projects are approved, the Proposed Action and Alternative B impacts on transportation, access, and public safety would not occur, and current traffic trends would continue.

4.17.5 Cumulative Effects Analysis

The CESA for transportation, access, and public safety is the same as the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). Cumulative effects on communities within the 90-minute commute area are discussed further in the Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report (BLM 2024g).

Past, present, and reasonably foreseeable future actions (**Table 4-2**) that would continue to affect traffic, access, and safety are as follows: travel associated with commercial mining, geothermal, solar, or wind developments with plans of development or plans of operation (required for minerals activities greater than 5 acres) and large-scale utility projects, such as the Greenlink West and Western Bounty projects. These activities and corridors would continue to have the potential for increased traffic delays and human-caused fires. Large-scale utility projects would have the potential for electromagnetic interference and human-caused fires.

Increased traffic from all travel in the analysis area would contribute to increased traffic hazards. Implementing the avoidance, minimization, or mitigation measures identified in **Section B.15** of **Appendix B** would minimize, but not completely avoid, the action alternatives' contributions to the cumulative effects.

Development activities within the planning area would involve vehicle operations during the construction, O&M, and decommissioning of utility, geothermal, and mining facilities. These activities would only result in cumulative effects on transportation, access, and public safety if they occur within the Esmeralda 7 projects' construction window and when vehicles access the planning area. Cumulative effects would include increased traffic and delayed access along SR 265 and other access roads. Some of the reasonably foreseeable future actions may require lane closures on SR 265, which would increase traffic delays; however, it is not likely that any of the projects would require both lanes on SR 265 to be closed at the same time.

Public access to access roads in the planning area may be restricted during the Best in the Desert Vegas to Reno desert OHV race (for 2 days). This race would increase recreationist encounters with construction vehicles in the planning area.

The Proposed Action would include implementing measures to mitigate and reduce health and safety impacts, such as reducing the potential of electromagnetic interference and human-caused fires. However, these measures would minimize, but cannot completely avoid, the Proposed Action's contributions to the cumulative effects of the past, present, and foreseeable future actions.

Under Alternative B, cumulative effects on transportation, access, and public safety would be the same as those described under the Proposed Action.

There would be no cumulative effects on transportation, access, and public safety under the No Action Alternative because no changes to current traffic, access, or public safety would occur.

4.18 VISUAL RESOURCES, INCLUDING NIGHT SKIES

4.18.1 Analysis Methods and Assumptions

The BLM meets the statutory requirements with the VRM program described in BLM Manual 8400, Visual Resource Management (BLM 1984); Handbook H-8410-1, Visual Resource Inventory (BLM 1986a); and Handbook 8431, Visual Resource Contrast Rating (BLM 1986b). The VRM program establishes national consistency for inventorying, planning, and managing the qualities of BLM-administered lands' visual resources.

The contrast rating system is a systematic process used by the BLM to analyze potential visual impacts of proposed projects and activities (BLM 1986b). The basic philosophy underlying the system is that the degree to which a management activity affects the visual quality of a landscape depends on the visual contrast created between a project and the existing landscape. This assessment process provides a means for determining visual impacts and for identifying measures to mitigate these impacts. The visual resource contrast rating process is described in detail at https://www.blm.gov/sites/blm.gov/files/uploads/Media_Library_BLM_Policy_H8431.pdf.

The use of BMPs to avoid or reduce the visual impacts of development is a key component in the BLM's fulfillment of its scenic resource management requirements while meeting its goals to facilitate renewable energy development on BLM-administered lands. BLM BMPs to reduce visual impacts are found in the following publications:

- Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands (BLM 2013)[40]—Chapter 4 contains BMPs for solar energy developments (such as using color-treated solar collectors and support structures) and general BMPs for renewable energy developments (such as collocating linear features in existing ROWs or corridors).
- Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Lands (Sullivan et al. 2023)[41]—Chapter 5 contains BMPs for artificial light at night on BLM-administered lands, such as having a lighting plan prepared by a qualified lighting designer.

[40] https://blmwyomingvisual.anl.gov/docs/BLM_RenewableEnergyVisualBMPs_LowRes.pdf
[41] https://www.blm.gov/sites/default/files/docs/2023-04/Library_BLMTechnicalNote457_final.pdf

The steps in the visual resource contrast rating process are summarized as follows:

1. Obtain project description: To effectively evaluate the visual impacts of the Proposed Action, a detailed project description is used. The level of detail required in the description should be commensurate with the type of project proposed. The Proposed Action is described above under **Section 1.2**, Alternatives.
2. Identify VRM class objectives: BLM-administered lands in the analysis area are VRM Class III and IV. Visual management objectives are established for each class:
   - Class III Objective. The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
   - Class IV Objective. The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.
3. Select KOPs: The contrast rating is done from the most critical viewpoints for an arc of view of approximately 120 degrees (to approximate binocular vision) across the landscape. This is usually along commonly traveled routes or at other likely observation points.
4. Prepare visual simulations: Simulations portray the relative scale and extent of a project. They also help individuals visualize and respond to development proposals, making public participation in the planning process more effective. Appendix B of the Visual Resources Supplemental Environmental Report contains existing landscape photos and photo simulations (BLM 2024h).
5. Complete the visual contrast rating worksheet (BLM Form 8400-4): Appendix C of the Visual Resources Supplemental Environmental Report contains the worksheets (BLM 2024h).

Additional details regarding the analysis method are provided in Section 4.1 of the Visual Resources Supplemental Environmental Report (BLM 2024h).

4.18.2 Alternative A. Proposed Action

Characterizing the long-term contrast created by the Proposed Action was performed by completing the contrast rating worksheet for each KOP. All design features and BMPs were considered in the rating. The rating was completed by determining the degree of contrast (strong, moderate, weak, or none) created in the basic features (land/waterbody, vegetation, and structures) for the basic elements (form, line, color, and texture). The following general criteria and factors were used when rating the degree of contrast:

- 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.

The following factors were considered when applying the above criteria: distance, angle of observation, length of time the Proposed Action is in view, relative size or scale, season of use, light conditions, recovery time, spatial relationships, atmospheric conditions, and motion.

The contrast ratings were used to determine conformance with VRM class objectives for the area. For comparative purposes, the four degrees of contrast (none, weak, moderate, and strong) roughly correspond with VRM Classes I, II, III, and IV, respectively. This means that a "strong" contrast rating may be acceptable in a VRM Class IV area, but it probably would not meet the VRM class objective for a VRM Class III area. In making these comparisons, the cumulative effect of all the contrast ratings was also considered. Certain combinations of ratings may indicate there is a stronger overall contrast than the individual ratings show. For example, several "moderate" ratings when viewed in combination may warrant an overall "strong" rating. This contrast rating provides a means for determining visual impacts and for identifying measures to mitigate impacts.

Construction would use vehicle lights and other lights to illuminate work sites for visibility and safety. Also, reflective surfaces on construction equipment and vehicles would create glare. The intensity and amount of light and glare would vary, depending on, for example, the light source and its orientation, the intensity and angle of sunlight, and the time of day and year. The impacts from construction lights and glare would occur only when construction equipment and vehicles are present.

Construction would add artificial light and glare to areas in the planning area that are nearly absent of artificial light. The artificial light would also increase skyglow (light that is scattered back to the earth by aerosols and clouds). Artificial light and skyglow can, in turn, affect the presence and behavior of animals viewed in the planning area. Given the negligible artificial light in the planning area, construction lights would essentially be the only sources of artificial light that would diminish the quality of dark skies and affect animal behaviors. The artificial light at night and skyglow would occur when construction equipment and vehicles are present. However, changes to animal behaviors and use of the planning area could be long term, depending on a variety of factors, including the type of animal and loss of habitat in the planning area.

The full buildout in the Proposed Action footprint would remove vegetation. It would add artificial elements to a natural landscape across the footprint. The artificial elements would not resemble elements in the natural landscape. Replacement of vegetation with artificial elements would change the form, color, line, and texture of the landscape across thousands of VRM Class III acres. Also, fencing would be installed around all project components and facilities, but existing access throughout the planning area would be maintained.

This type of moderate to strong change would not be consistent with the VRM Class III objective to partially retain the landscape's existing character. This type of management activity would attract attention and would dominate the view of the casual observer for the KOPs closest to the Proposed Action (KOPs 4N, 4S, and 8). Distance was accounted for in the contrast ratings. Not all KOPs are in nonconformance; only the closer KOPs are in nonconformance. For more distant KOPs, it is more difficult for management activities to attract attention and dominate the view of the casual observer across broad views of the valley.

Because the Proposed Action would not meet the VRM Class III objective, an RMPA would change VRM Class III lands to VRM Class IV lands. The RMPA would be for 8,110 acres of VRM Class III lands that are not associated with the Greenlink West transmission line ROW (BLM GIS 2023). The strong contrast created by the Proposed Action would conform with the newly designated VRM Class IV lands.

Regardless of conformance determination, all design features and BMPs (see **Section B.16** of **Appendix B**) would be implemented as part of the Proposed Action to minimize contrast. No additional mitigation is proposed at this programmatic analysis level to reduce the contrast created by the Proposed Action. Subsequent site-specific NEPA analysis may identify mitigation that reduces the contrast created by a specific development. The mitigation could be for areas that do or do not conform with VRM class objectives.

4.18.3 Alternative B. Soils and Vegetation Conservation Alternative

Under Alternative B, the effects on visual resources would be similar to the effects described under the Proposed Action. Applicants would limit traditional construction grading methods, which remove all vegetation and compact the soil, to a maximum of 35 percent of the proposed development area. Applicants would use mowing in the rest of the development area to leave vegetation intact. Although this would reduce the contrasts in form, color, and texture created by vegetation changes, it would not allow KOPs 4N, 4S, and 8 to conform to VRM Class III objectives; this is because of the contrasts created by new infrastructure. Regardless of conformance determination, all design features and BMPs (see **Section B.16** of **Appendix B**) would be implemented to minimize contrast.

4.18.4 Alternative C. No Action Alternative

Under Alternative C, the No Action Alternative, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. Impacts associated with the Proposed Action and Alternative B would not occur. Ongoing human uses of the planning area, including ROW maintenance, off-road recreation, highway vehicle use, and road maintenance, would continue to result in localized ground disturbance and vegetation removal. These would contribute to ongoing, localized changes in visual resources. Until additional analysis is completed, and projects are approved, there would be no need for an RMPA because there would be no activities that do not conform to VRM class objectives.

4.18.5 Cumulative Effects Analysis

The CESA includes the area of analysis with a buffer of approximately 10 miles from the KOPs. The area encompasses some private land as well as federal lands. The timescale for the cumulative analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Past, present, and reasonably foreseeable future actions would have impacts on visual resources that are similar to those from the Proposed Action. The bold colors and geometric, boxy forms of construction vehicles, materials, and equipment would not resemble the natural colors and forms of the surrounding terrain and vegetation. Construction and operations would generate dust from vehicle movement, excavation, and wind. Fugitive dust would diminish the atmospheric clarity. Construction would use vehicle lights and other lights to illuminate work sites for visibility and safety. Also, reflective surfaces on construction equipment and vehicles would create glare. Construction and operations would add artificial light and glare to areas that are nearly absent of artificial light.

The ground surface could be disturbed by covering it with material for roads or impervious surfaces. The flat and simple road or impervious surface would not resemble the uneven and complex forms of the undisturbed areas immediately beyond these surface disturbances. Artificial infrastructure would introduce linear and angular artificial elements that do not resemble the surrounding natural landscape and would stand out against the surrounding muted greens and tans. They would also stand out if they are on higher topography or do not follow the natural contours of the terrain. These impacts from past, present, and reasonably foreseeable future actions are more pronounced for larger projects involving energy development, energy transmission, mining, and transportation.

When combined with the past, present, and reasonably foreseeable future actions described above, the Proposed Action would contribute to cumulative effects on visual resources from activities creating visual contrast. These would affect the visual quality of the landscape. Surface disturbances, new infrastructure, and the loss of vegetation would create a visual contrast in the long term. This cumulative impact would not be concentrated in a specific area; rather, it would occur in various locations in the CESA, which would contribute to the fragmentation of the landscape. Landscape fragmentation is the physical disintegration of continuous habitats into smaller units or patches, which decreases the intactness of the natural landscape viewed by residents and visitors.

Cumulative effects under Alternative B would be similar to those described above under the Proposed Action with somewhat fewer cumulative impacts on visual resources. This is because Alternative B would limit traditional construction grading methods and implement mowing to leave vegetation intact.

There would be no cumulative effects on visual resources or night skies under the No Action Alternative.

4.19 WASTES AND MATERIALS (HAZARDOUS AND SOLID)

4.19.1 Analysis Methods and Assumptions

The study area for wastes and materials (solid and hazardous) is the planning area (**Table 4-1**, **Figure 4-1**, **Appendix A**). The wastes and materials analysis uses the following indicator: the potential for chemical spills and hazards from solar development.

The wastes and materials analysis uses the following assumption:

- Solar development applicants would follow all NDEP and BLM BMPs, standard operating procedures, regulations, and requirements.

4.19.2 Alternative A. Proposed Action

The Proposed Action would have the potential to result in the use of hazardous materials and waste management practices during the life of the solar development projects. This has the potential to affect air, water, soil, and biological resources from an accidental release of hazardous materials or solid and hazardous waste during transportation to and from the project development sites, or during storage and use at the project development sites. The safety and containment measures that would be implemented during the handling and transport of hazardous materials would minimize the potential for transport-related spills and any spill-related effects, which would likely be minor, short term, and localized.

Applicants would be required to identify waste streams that would be expected to be generated at the site and address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures in a construction operation waste management plan. The construction operation waste management plan would also address all solid and liquid wastes that could be generated at the site, in compliance with the Clean Water Act requirements to obtain the project's National Pollutant Discharge Elimination System permit.

Applicants would regularly inspect facility components. Applicants also would develop an emergency response plan that would present the results of a comprehensive facility hazard analysis and a response plan for each identified hazard. Under this emergency response plan, any hazardous materials on the site would be handled, stored, and disposed of in accordance with laws and regulations. Waste from the sites would be recycled or disposed of in an approved facility.

Under the Proposed Action, the applicants would install a PV panel array at various development sites. The PV panel array would typically include crystalline-silicon solar PV cells; different types of solar panels contain varying levels of hazardous materials, which can include metals like lead and cadmium, which are harmful to human health and the environment at high levels. These hazardous materials are of greatest concern at the end of their life. Applicants would remove all PV arrays, structures, equipment, and infrastructure from the site and dispose of these components in a manner specified in the approved decommissioning, abandonment, and site reclamation plans. The decommissioning, abandonment, and site reclamation plans would include all activities required to dispose of or store all hazardous and toxic materials and chemicals associated with the project.

To reduce potential impacts from wastes and materials, the following design features would be also required:

- Identify existing hazards by conducting a phase I site assessment; if the phase I site assessment identifies environmental conditions, concerns, or data gaps requiring additional site assessment to adequately characterize the site, the applicant would conduct additional site assessment work (such as phase 2) with appropriate regulatory agency oversight.
- Contain construction waste using a construction operation waste management plan. The plan would identify the waste streams that are expected to be generated at the site and address hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures.

See **Section B.17** of **Appendix B** for more information about the measures used to identify existing hazards, contain construction waste, contain hazardous waste, ensure compliance, ensure secondary containment, minimize risks for herbicides, minimize the potential for fire, ensure compliance with the spill prevention and emergency plan, and ensure contaminated soils are contained and removed.

4.19.3 Alternative B. Soils and Vegetation Conservation Alternative

Alternative B's change to the slope requirements would neither change the potential for chemical spills and hazards from solar development nor change the BMPs, standard operating procedures, regulations, requirements, spill prevention plans, or other measures used to reduce potential impacts. Therefore, the impacts on wastes and materials under Alternative B would be the same as the impacts under the Proposed Action.

4.19.4 Alternative C. No Action Alternative

Under the No Action Alternative, operations in the planning area would continue, based on current authorizations. Until additional analysis is completed, and projects are approved, there would be no potential for chemical spills or solid and hazardous material generation from the proposed solar facilities and no implementation of related BMPs, standard operating procedures, or other actions to comply with the regulations and requirements.

4.19.5 Cumulative Effects Analysis

The cumulative effects analysis boundary for wastes and materials (hazardous and solid) is the planning area. Past, present, and reasonably foreseeable future actions that would continue to affect wastes and materials (solid and hazardous) would include any mining, geothermal, solar, and wind developments, as well as utilities and road ROWs within the planning area.

Historically, the planning area has been largely undeveloped. There are several mining claims but limited activity, with one geothermal observation well drilled in the 1990s. The planning area does not contain any known hazardous substances or petroleum products (Converse 2023; Stantec 2022h, 2022i).

Currently, mining, geothermal, solar, and wind projects, such as lithium mining under American Battery Technology Co, geothermal leasing under Baseload Power US Holdings, wind development under Comstock Wind LLC, solar development grants under Boulevard Associates LLC, and geothermal leasing under Baseload Power US Holdings are present in the CESA for wastes and materials (hazardous and solid). These activities and corridors would continue to have the potential for hazardous materials and waste management practices, which could affect air, water, soil, and biological resources from an accidental release of hazardous materials or solid and hazardous waste during transportation to and from the project sites, or during storage and use at the project development sites.

Reasonably foreseeable future actions would include the Greenlink West/NV Energy and Western Bounty/Gallatin Power projects, Ormat Nevada's geothermal lease, and mining through Allegiant Gold. These energy and mining projects would have the potential to result in the use of hazardous materials and waste management practices during the life of the development projects. These have the potential to affect air, water, soil, and biological resources from an accidental release of hazardous materials or solid and hazardous waste during transportation to and from the project sites, or during storage and use at the project development sites.

When combined with these past, present, and foreseeable future actions, the Proposed Action would contribute to waste generation and the potential for hazardous material release in the CESA for wastes and materials (hazardous and solid). The primary potential impact would be the potential to harm human health and the environment with the release of hazardous materials. Implementing the design features and avoidance, minimization, or mitigation measures identified in **Section B.17** of **Appendix B** would minimize, but not completely prevent, the Proposed Action's contributions to the cumulative effects.

Alternative B would contribute to waste generation and the potential for hazardous material release in the analysis area. The cumulative effects from Alternative B on wastes and materials (hazardous and solid) would be the same as the cumulative effects under the Proposed Action.

Under the No Action Alternative, there would be no contributions to the cumulative effects for wastes and materials (hazardous and solid).

4.20 WILD HORSES AND BURROS

4.20.1 Analysis Methods and Assumptions

This analysis addresses potential impacts on wild horses and burros from implementing the Proposed Action and Alternative B. This analysis assumes the following:

- The wild horse and burro population would continue to increase without active management.
- Wild horse and burro herds would be managed within the AML range through gathers and the selected application of additional population-control practices.

4.20.2 Alternative A. Proposed Action

Under the Proposed Action, the development of the seven solar projects would cause direct displacement of wild horses and burros on a small portion of the Silver Peak HMA due to fences and construction. Reducing the size of the HMA could cause a loss in available forage, which in turn could necessitate a reduction in the AMLs. However, as there are currently no burros present, impacts are likely to be negligible.

Human activities during construction and operation of the solar facilities would cause ground disturbance, which could also cause a reduction in available forage, as mentioned above. During construction, there would be vehicle traffic coming in and out of the planning area that would not only cause ground disturbance but noise disturbance as well. Increased human activity could also lead to vehicle collisions and injury to the wild horses or burros, or to the humans.

Increased human activity and ground disturbance could lead to the spread of noxious weeds and the increased possibility of wildfire; both would reduce the quality or availability of forage. Implementing design features (**Appendix B**) for minimizing impacts on wild horses and burros (see design feature WHB1-1) and creating wild horse and burro friendly roads (see design feature WHB2-1) would reduce impacts on these animals within their HMAs.

4.20.3 Alternative B. Soils and Vegetation Conservation Alternative

The impacts on wild horses and burros would be similar to those described under the Proposed Action. The limit on traditional construction grading methods would potentially leave more forage (even with mowed forage) available for wild horse and burro utilization.

4.20.4 Alternative C. No Action Alternative

Under Alternative C, the No Action Alternative, the BLM would not amend the Tonopah RMP. In addition, future development could be constrained by the existing VRM classifications or slope requirements. There would be no impacts on wild horses and burros under the No Action Alternative at the levels or timeframes described under the Proposed Action.

4.20.5 Cumulative Effects Analysis

The CESA for wild horses and burros is the area within the Silver Peak HMA (**Table 4-1**, **Figure 4-1**, **Appendix A**). The timescale for the analysis is the lifetime of the solar ROW leases and ROW grant. Generally, a BLM ROW is granted for a term appropriate for the life of the project, which is anticipated to be 50 to 60 years, depending on maintenance operations and climatic conditions.

Cumulative impacts may result from activities on adjacent BLM-administered lands, as well as lands under other ownerships from other resource use activities. Wild horse and burro management is broadly consistent across federal landownership due to adherence with current federal laws, regulations, and policies. Past, present, and reasonably foreseeable future actions for rangeland and grazing management include various ROWs.

Past and present actions, such as ROW access routes, would have minor impacts on the HMA, likely only in specific areas where access routes are established. These would cause ground disturbance and a decrease in forage in those isolated areas.

Wild horse and burro gathers would continue to be implemented in the reasonably foreseeable future outside the HMAs and to maintain the AMLs within the HMAs. The reduced number would allow for more forage for the remaining wild horses, reduce competition, and reduce trampling around water sources. Otherwise, cumulative impacts on wild horses and burros would be negligible.

The No Action Alternative would not have a cumulative contribution on wild horses and burros.

Chapter 5. Resource Management Plan (Land Use Amendments)

If a proposed project does not conform to the applicable plan, the BLM may modify the proposal so that it conforms to the plan, deny the proposal, or amend the plan to authorize the action. As described in detail below, several amendments to the existing Tonopah RMP would be required before the BLM could authorize the Esmeralda 7 projects as currently proposed, with no modifications. Plan amendments may be grouped geographically or by the type of decision in the same amendment process.

The NOI published in the *Federal Register* on November 13, 2023, notified the public of the potential for plan amendments for the Esmeralda 7 projects. The BLM plan amendments are subject to public review and the procedures outlined in the BLM's planning regulations (43 CFR 1610.2). Pursuant to these regulations, outreach activities were conducted to gather public input on the Esmeralda 7 projects and proposed amendments, planning criteria were developed and circulated for use in the amendment evaluation, and an analysis of where plan amendments would be necessary was incorporated into this PEIS/RMPA. The BLM plan amendment procedures also call for an extended 90-day public review of proposed plan amendments concurrently with the release of the Draft PEIS/RMPA. The BLM's regulations in 43 CFR 1610.3-2 require a concurrent 30-day public protest period (43 CFR 1610.5-2) and 60-day governor's consistency review with the release of the Final PEIS/RMPA.

5.1 Applicable Resource Management Plan

Actions that occur on federal lands administered by the BLM, including the granting of ROWs under Title V of FLPMA, are guided by decisions recorded in the Tonopah RMP.

5.2 Planning Issues and Criteria

The BLM developed the following planning criteria for the potential plan amendments:

- Criterion 1: The BLM will use a systematic, interdisciplinary approach to integrate physical, biological, economic, and other sciences.
- Criterion 2: The BLM will use the best available data regarding natural resources.
- Criterion 3: The BLM will consider the present and potential uses of public lands; where existing RMP decisions are valid, those decisions will remain unchanged.
- Criterion 4: The BLM will consider the relative scarcity of values and availability of alternative means and sites for recognizing those values.
- Criterion 5: Any plan amendments will be completed in compliance with FLPMA, NEPA, and all other relevant federal laws, executive orders, and BLM policies.
- Criterion 6: The BLM will seek coordination and consistency with other government programs, including tribal plans and policies.
- Criterion 7: Existing land use planning decisions will not change unless specifically amended.
- Criterion 8: Any RMP amendments will recognize valid existing rights.

5.3 Proposed Plan Amendment for VRM Classifications

The planning area includes landscapes designated as VRM Class III and IV. Landscapes designated as VRM Class III allow for management and project activities that may attract attention, but they should not dominate the view of the casual observer. Major modification of the landscape's existing character within VRM Class IV provides for management and project activities that would attract attention and dominate the landscape.

Portions of the proposed Esmeralda 7 projects' operations would not conform to the VRM Class III objectives established in the Tonopah RMP (BLM 1997) for the management of visual resource values. When viewed from the immediate foreground distance zone (0 to 0.5 miles) of the identified KOPs, the construction and operation of the action alternatives' solar facilities would create a moderate to strong visual contrast in terms of scale, line, form, color, and texture in the characteristic landscape and would attract attention and dominate the landscape. Therefore, a plan amendment would be required for the Esmeralda 7 projects to be in VRM conformance with the RMP.

5.4 Proposed Plan Amendment for Slope Classification

Approximately 320 acres of the Esmeralda 7 projects' operations would not conform to the Solar RMPA (BLM 2012), which amended the Tonopah RMP (BLM 1997) and limits the siting of solar panels to lands with slopes that are 5 percent or less (see **Table 5-1**). Therefore, a plan amendment is proposed under Alternatives A and B for the Esmeralda 7 projects to site solar panels on lands with slopes greater than 5 percent, to be in conformance with the RMP.

Table 5-1. Slope Percentages in the Planning Area

Slope Percentage	Acres
0–5	61,970
6–10	260
11–15	40
16–20	10
Total	**62,280**

Source: BLM GIS 2023

Chapter 6. Consultation, Coordination, and Public Involvement

6.1 Introduction

In addition to the planning, analysis, and review activities performed in preparation for this PEIS/RMPA, the BLM is conducting consultation, coordination, and public participation efforts. These efforts began with the public scoping period when the NOI was published in the *Federal Register* on November 13, 2023, and will continue throughout the PEIS/RMPA process. The purpose of the consultation and coordination program is to encourage interaction between the BLM and other federal, state, and local agencies; Native American tribes; and the public. The BLM's role is to inform the public about the project and solicit input to assist in analysis and decision-making. The BLM has made formal and informal efforts to involve, consult with, and coordinate with these entities to ensure that the most appropriate data have been gathered and analyzed and that agency policy and public sentiment and values are considered and incorporated.

6.2 Consultation and Coordination with Agencies and Tribal Governments

The BLM contacted agencies and organizations that have jurisdiction or special expertise, or both, in the planning area prior to scoping, at the start of scoping, during resource inventory, and before the publication of the Draft PEIS/RMPA. This section describes the specific actions taken by the BLM to consult and coordinate with Native American tribes, cooperating agencies, and other government agencies. Various federal laws require the BLM to consult with Native American tribes, the SHPO, the USFWS, the US Environmental Protection Agency, and cooperating agencies during the NEPA decision-making process. In addition to formal scoping, the BLM implemented collaborative outreach and a public involvement process that included inviting agencies to be cooperative partners for the PEIS/RMPA NEPA process.

6.3 Section 106 Consultation

The BLM is required to prepare the PEIS/RMPA in coordination with studies or analyses required by the NHPA, as amended (54 USC 300101 et seq.). In accordance with Section 106 (54 USC 306108) of the NHPA, federal agencies are required to consider the effects of the agencies' undertakings on historic properties listed on, or eligible for listing on, the NRHP. The regulations also specify the need for meaningful consultation with SHPOs, Tribal Historic Preservation Offices, Native American tribes, and other interested parties during all phases of Section 106 compliance.

Pursuant to 36 CFR 800, and as lead federal agency for the undertaking, the BLM initiated Section 106 consultation on March 15, 2022. Consultation was conducted under the NHPA substitution regulations located at 36 CFR 800.8(c). Additional details about how the BLM has met its obligations under the 36 CFR 800.8(c) process can be found in **Section 3.4**, Cultural Resources.

6.4 Government-to-Government Consultation with Native American Tribes

The US has an important legal relationship with Native American tribes, as established by the US Constitution, treaties, executive orders, federal statutes, and federal and tribal policies. As sovereign nations, Native American tribes have legal rights and benefits with respect to their relationship with the

US government. This relationship is founded on the US government's trust responsibilities to safeguard tribal sovereignty and self-determination, as well as tribal lands, assets, and resources reserved by treaty and other federally recognized rights. Federal agencies are required by statute and regulation to consult with Native American tribes on a government-to-government basis on federal actions or undertakings that may affect trust assets, including cultural and natural resources of tribal concern. Government-to-government consultation involves the process of seeking, discussing, and considering tribes' views on policies, undertakings, and decisions, such as environmental review of the proposed projects. The venue for government-to-government consultation has followed the established form of contact preferred by each tribe. Consultation has generally involved formal letters and submission of materials via US Postal Service certified mail with follow-up telephone contact. The BLM contacted the following tribal governments on March 15, 2022, requesting coordination and consultation during the PEIS/RMPA process:

- Big Pine Paiute Tribe of the Owens Valley
- Bishop Paiute Tribe
- Duckwater Shoshone Tribe
- Moapa Band of Paiutes
- Shoshone-Paiute Tribes Duck Valley Indian Reservation
- Timbisha Shoshone Tribe
- Utu Utu Gwaitu Paiute Tribe
- Yomba Shoshone Tribe

The BLM will organize a government-to-government consultation meeting to occur with Native American tribes during the Draft PEIS/RMPA public comment period. The BLM will organize future meetings with Native American tribes before the Final PEIS/RMPA and ROD are published.

6.5 Cooperating Agencies

The BLM is continually working to formalize agreements with cooperating agencies. Cooperating agencies are those that the BLM has agreed have the requisite jurisdiction by law or special expertise necessary to participate in the preparation of the PEIS/RMPA The BLM invited the following agencies and tribal entities to participate as cooperating agencies during this NEPA process:

- Big Pine Paiute Tribe of the Owens Valley
- Bishop Paiute Tribe
- Duckwater Shoshone Tribe
- Esmeralda County
- Moapa Band of Paiutes
- NDOW
- Nevada Division of Forestry
- NDWR
- Nye County
- Shoshone-Paiute Tribes Duck Valley Indian Reservation
- Timbisha Shoshone Tribe

- US Environmental Protection Agency, Region IX
- USFWS (Ecological Services Program and Migratory Birds Program)
- Utu Utu Gwaitu Paiute Tribe
- Yomba Shoshone Tribe

As of January 2024, the following agencies have agreed to participate as cooperating agencies during this NEPA process:

- Esmeralda County
- Moapa Band of Paiutes
- NDOW
- US Environmental Protection Agency, Region IX
- USFWS

6.6 PUBLIC INVOLVEMENT

Public participation in the PEIS/RMPA process occurs during the scoping period, review of the Draft and Final PEIS/RMPA, and receipt of the ROD. The BLM maintains an ePlanning PEIS/RMPA website at https://eplanning.blm.gov/eplanning-ui/project/2020804/510. The website includes background documents, information on public meetings, and contact information for the BLM planning team.

6.6.1 Scoping

As defined in Title 43, Subtitle A, Part 46, Subpart C 46.235(a)(b) of NEPA, scoping is a process that continues throughout the planning and early stages of preparation of an EIS. For an EIS, bureaus must use scoping to engage state, local, and tribal governments and the public in early identification of concerns, potential impacts, relevant effects of past actions, and possible alternative actions. Scoping is an opportunity to introduce and explain the interdisciplinary approach and solicit information as to additional disciplines that should be included. Scoping also provides an opportunity to bring agencies and applicants together to lay the groundwork for setting time limits; expediting reviews, where feasible; integrating other environmental reviews; and identifying any major obstacles that could delay the process.

In scoping meetings, in newsletters, or by other communication methods appropriate to scoping, the lead agency must make it clear that the lead agency is ultimately responsible for determining the scope of an EIS and that suggestions obtained during scoping are only options for the agency to consider.

The scoping period began with the publication of the NOI, titled "Notice of Intent To Amend the Resource Management Plan and Prepare an Associated Programmatic Environmental Impact Statement for the Esmeralda Solar Projects, Esmeralda County, Nevada" in the *Federal Register* (Vol. 88, No. 217, pages 77605–77607) on November 13, 2023. The NOI initiated the public scoping process for the PEIS/RMPA. During this period, the BLM sought public comments to determine relevant issues that could influence the scope of the environmental analysis, including alternatives, and to guide the process for developing the PEIS/RMPA.

As part of the ongoing land use planning for the Esmeralda 7 PEIS/RMPA, the BLM hosted two virtual public meetings; one was on November 29, 2023, and one was on November 30, 2023. The BLM held the virtual public meetings via the Zoom platform. Participants were able to register for the virtual public meetings online, and they received a meeting invitation once registration was complete. The meeting began with a PowerPoint presentation describing the purpose of the PEIS/RMPA and the PEIS/RMPA approach; the BLM also facilitated a question-and-answer session and verbal public comment session.

Table 6-1 provides a summary of the affiliation of scoping comment submissions. During the public scoping period, the BLM received 65 comment submissions; 13 of these submissions were nearly identical submissions from a form letter campaign. The BLM also received 14 verbal comments during the public scoping meetings. In total, 350 unique substantive comments were identified from all comment submissions.

Table 6-1. Comment Submissions by Affiliation

Affiliation	Number of Submissions	Percentage of Total Submissions
Individuals	32	49
Organizations and industry groups	29	44
Local agencies	1	2
State agencies	1	2
Federal agencies	2	3
Total	**65**	**100**

Table 6-2 summarizes the distribution of scoping comments and submissions by issue category.

Table 6-2. Scoping Comments by Issue Category

Issue Category	Number of Comments	Percentage of Total Comments
NEPA	49	14.0
Public outreach	7	2.0
Cooperating agency relationships	4	1.1
Purpose and need	8	2.3
Range of alternatives	2	<1.0
No Action Alternative	7	2.0
New alternative proposed	12	3.4
Best available science and information	3	<1.0
Direct and indirect impacts	10	2.9
Cumulative impacts	19	5.4
Mitigation and monitoring	9	2.6
Project design features and BMPs	5	1.4
Agency consultation and tribal consultation	5	1.4
FLPMA	6	1.7
Resources and uses	—	—
Air quality and climate change	6	1.7
ACEC	5	1.4
Biological resources	8	2.3
Invasive, nonnative species	2	<1.0
Avian species	4	1.1
Threatened, endangered, and special status species	25	7.1
Vegetation	7	2.0
Wildlife	19	5.4

Issue Category	Number of Comments	Percentage of Total Comments
Cultural resources	9	2.6
Floodplains	8	2.3
Water quality	1	<1.0
Water quantity	7	2.0
Wetlands and riparian zones	1	<1.0
Geology and minerals	27	7.7
Lands with wilderness characteristics	10	2.9
Paleontological resources	2	<1.0
Rangeland and grazing management	2	<1.0
Recreation	12	3.4
Social values, economic conditions, and EJ	24	6.9
Soils	4	1.1
Transportation, access, and public safety	6	1.7
Visual resources, including night skies	11	3.1
Wastes and materials	4	1.1
Total	**350**	**100**

Note: < = less than

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References

335ES 8me LLC. 2021. Plan of Development for the Red Ridge 1 Solar Project. Prepared by Transcon Environmental, Inc., Berkeley, California. August 25, 2021.

336SP 8me LLC. 2021. Plan of Development for the Red Ridge 2 Solar Project. Prepared by Transcon Environmental, Inc., Berkeley, California. August 25, 2021.

Albers, J. P., and J.H Stewart. 1965. Preliminary Geologic map of Esmeralda County, Nevada. Internet website: https://pubs.nbmg.unr.edu/Geol-map-Esmeralda-Co-p/mf0298.htm.

Attenborough, K. 2014. "Sound propagation in the atmosphere." In: *Springer Handbook of Acoustics* (T. D. Rossing, Editor). Springer, New York (DOI: 10.1007/978-0-387-30425-0_4). Pp. 113–147.

BEA (Bureau of Economic Analysis). 2021. Gross Domestic Product by County, 2021. Internet website: https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas.

______. 2022a. Regional Economic Accounts from A Profile of Socioeconomic Trends for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022b. Regional Economic Accounts from A Profile of Socioeconomic Trends for Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022c. Regional Economic Accounts from A Profile of Socioeconomic Trends for California, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022d. Regional Economic Accounts from A Profile of Socioeconomic Trends for Inyo County, California, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022e. Regional Economic Accounts from A Profile of Socioeconomic Trends for Mono County California, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022f. Regional Economic Accounts from A Profile of Socioeconomic Trends for Esmeralda County, Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022g. Regional Economic Accounts from A Profile of Socioeconomic Trends for Lyon County, Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022h. Regional Economic Accounts from A Profile of Socioeconomic Trends for Mineral County, Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022i. Regional Economic Accounts from A Profile of Socioeconomic Trends for Nye County, Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

BEC (BEC Environmental Inc.). 2023. Smoky Valley Solar Project Draft Biological Resources Review. Las Vegas, Nevada.

Belnap, J., R. Rosentreter, S. Leonard, J. H. Kaltenecker, J. Williams, and D. Eldridge. 2001. Biological Soil Crusts: Ecology and Management. US Department of the Interior, Bureau of Land Management Technical Reference 1730-2. Denver, Colorado.

Bio-Logical (Bio-Logical LLC). 2022. Special Status Plant Survey for Esmeralda Solar Project, Esmeralda County, Nevada. Boulder City, Nevada.

Bitd.com (Best in the Desert Racing Association). 2022. 2022 Method Race Wheels "Casey Folks" Vegas to Reno – Official Results. Internet website: https://bitd.com/wp-content/uploads/2022/08/2022-V2R-Results-Overall.pdf.

Blickley J. L., and G. L. Patricelli. 2010. "Impacts of anthropogenic noise on wildlife: Research priorities for the development of standards and mitigation." *Journal of International Wildlife Law and Policy* 13(4): 274–292.

BLM (US Department of the Interior, Bureau of Land Management). BLM 1986a. Handbook H-8410-1-Visual Resource Inventory. Rel. 8-28, January 17, 1986. BLM, Washington, DC.

______. 1986b. Handbook H-8431—Visual Resource Contrast Rating. Rel. 8-30, January 17, 1986. BLM, Washington, DC.

______. 1994. Proposed Tonopah Resource Management Plan and Final Environmental Impact Statement. Battle Mountain, Nevada.

______. 1997. Approved Tonopah Resource Management Plan and Record of Decision. DOI-BLM-NV-B020-1994-0001-RMP-EIS. Battle Mountain, Nevada.

______. 2005. Land Use Planning Handbook H-1601-1. Washington, DC.

______. 2007. Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. Washington, DC.

______. 2008a. BLM National Environmental Policy Act Handbook H-1790-1. Washington, DC.

______. 2008b. Handbook H-1740-2, Integrated Vegetation Management. Release 1714. Washington, DC.

______. 2009a. Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office. Battle Mountain District, Battle Mountain, Nevada.

______. 2009b. Subject 1703 – Hazardous Management and Resource Restoration (Public). Internet website: https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual1703.pdf.

______. 2010. Wild Horses and Burros Management Handbook. BLM Handbook H-4700-1. US Department of the Interior, Bureau of Land Management, Washington DC.

______. 2012. Approved Resource Management Plan Amendments/Record of Decision (ROD) for Solar Energy Development in Six Southwestern States. DOI-BLM-NV-0000-2011-0001-EIS. Internet website: https://eplanning.blm.gov/eplanning-ui/project/2017069/570.

______. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management, Cheyenne, Wyoming.

______. 2016. Vegetation Treatments Using Aminopyralid Fluroxypyr and Rimsulfuron on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement. DOI-BLM-WO-WO2100-2012-0002-EIS. Washington, DC.

______. 2021a. Conducting Wilderness Characteristics Inventory on BLM Lands. Manual 6310. Release 6-138. US Department of the Interior, Bureau of Land Management, Washington, DC.

______. 2021b. Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process. Manual 6320. Release 6-139. US Department of the Interior, Bureau of Land Management, Washington, DC.

______. 2022a. Addressing Environmental Justice in NEPA Documents: Frequently Asked Questions. US Department of the Interior, Bureau of Land Management, Socioeconomics Program, Washington, DC.

______. 2022b. Instruction Memorandum (IM) 2022-059. Environmental Justice Implementation. September 20, 2022. Internet website: https://www.blm.gov/policy/im2022-059.

______. 2023. Nevada Multi-District Off-Highway Vehicle Special Recreation Permit Programmatic Environmental Assessment. Nevada State Office. Internet website: https://eplanning.blm.gov/eplanning-ui/project/2024119/510.

______. 2024a. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Public Scoping Report. Internet website: https://eplanning.blm.gov/eplanning-ui/project/2020804/570.

______. 2024b. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Supplemental Information Report. June 2024. Battle Mountain, Nevada.

______. 2024c. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Air Quality and Climate Change Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024d. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Biological Resources Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024e. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Cultural Resources Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024f. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Hydrologic Resources Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024g. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Social Values, Economic Conditions, and Environmental Justice Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024h. Esmeralda 7 Solar Project Environmental Impact Statement and Resource Management Plan Amendment Visual Resources Supplemental Environmental Report. June 2024. Battle Mountain, Nevada.

______. 2024i. Herd Area and Herd Management Area Statistics. March 1, 2024. Internet website: https://www.blm.gov/sites/default/files/docs/2024-03/2024_HMA-HA_PopStats_2-29-2024_COMBINED_Clean_FINAL_web.pdf.

BLM GIS (US Department of the Interior, Bureau of Land Management Geographic Information Systems). 2023. GIS data used in the Esmeralda Seven Adjacent Solar Energy Projects, Environmental Impact Statement and Resource Management Plan Amendments. Esmeralda County, Nevada.

BLS (Bureau of Labor Statistics). 2022a. Local Area Unemployment Statistics (LAUS) for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022b. A Profile of Mining, Including Oil and Gas for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022c. A Profile of Mining, Including Oil and Gas for California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2023. Local Area Unemployment Statistics (LAUS) for California and Nevada, and Selected Counties in California and Nevada. Internet website: https://www.bls.gov/data/tools.htm.

Boulevard Associates LLC. 2021. Boulevard Associates LLC, a subsidiary of NextEra Energy Resources LLC. Esmeralda Energy Center Project Description. Internet website: https://www.blm.gov/sites/default/files/docs/2021-09/nv-Esmeralda-Solar-Project-Description-04212021_0.pdf.

Bryce, S. A., A. J. Woods, J. M. Omernik, T. R. McKay, G. K. Brackley, R. K. Hall, D. K. Higgins, et al. 2003. Ecoregions of Nevada. US Geological Survey, Reston, Virginia.

Buqo, T. S. 2004. Nye County Water Resources Plan. Internet website: https://www.nyecountynv.gov/DocumentCenter/View/145/Nye-County-Water-Resources-Plan.

CDOF (California Department of Finance). 2021. Report P-2A: Total Population Projections, California Counties, 2010–2060 (Baseline 2019 Population Projections; Vintage 2020 Release). Demographic Research Unit, Sacramento, California. Internet website: https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fdof.ca.gov%2Fwp-content%2Fuploads%2Fsites%2F352%2FForecasting%2FDemographics%2FDocuments%2FP2A_County_Total.xlsx&wdOrigin=BROWSELINK.

CEQ (Council on Environmental Quality). 1997. Environmental Justice Guidance under the National Environmental Policy Act. Internet website: https://www.epa.gov/sites/default/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf.

______. 2024. National Environmental Policy Act Implementing Regulations Revisions Phase 2. May 1, 2024. Internet website: https://www.govinfo.gov/content/pkg/FR-2024-05-01/pdf/2024-08792.pdf.

CG Western Renewables III LLC. 2021. Smoky Valley Solar Preliminary Plan of Development. Internet website: https://www.blm.gov/sites/default/files/docs/2021-09/nv-CG-Western-Renewables-III-LLC-POD-Solar%20Production.pdf.

Champ, P. A., K. J. Boyle, and T. C. Brown. 2017. *The Economics of Non-Market Goods and Resources, Volume 13. A Primer on Nonmarket Valuation*, Second Edition. Internet website: https://econ676.weebly.com/uploads/1/6/5/9/16597232/champ_boyle___brown_--_primer_2017.pdf.

CNRWA (Central Nevada Regional Water Authority). 2023. Well Measurement Data Report. September. Internet website: https://cnrwa.com/wp-content/uploads/2023/01/CNRWA-WATER-LEVEL-MEASUREMENT-FILE-2022.pdf.

Converse Consultants. 2023. Phase I Environmental Site Assessment Report. Smoky Valley Solar Project. Monrovia, CA.

Crafford, A. E. J. 2007. Geological Map of Nevada: US Geological Survey Data Series 249. Internet website: https://pubs.usgs.gov/ds/2007/249/.

______. 2008. Paleozoic tectonic domains of Nevada — an interpretive discussion to accompany the geologic map of Nevada. Geosphere, Volume 4 number 1. Internet website: https://pubs.geoscienceworld.org/gsa/geosphere/article/4/1/260/132323/Paleozoic-tectonic-domains-of-Nevada-An.

______. 2010. Geologic Terrane Map of Nevada, Plates 1 and 2. Nevada Bureau of Mines and Geology Open-File report. University of Nevada, Reno. Internet website: https://pubs.nbmg.unr.edu/Geol-terrane-map-NV-2-plates-p/of2010-04.htm.

Cruz, C., G. Santulli-Sanzo, and G. Ceballos. 2021. "Global patterns of raptor distribution and protected areas optimal selection to reduce the extinction crises." *Proceedings of the National Academy of Sciences* 118(37): p.e2018203118.

Davies, K. W., J. D. Bates, and A. M. Nafus. 2011. "Are there benefits to mowing Wyoming big sagebrush plant communities? An evaluation in southeastern Oregon." *Environmental Management* 48: 539–546.

DeCarlo, Matthew, Loukas Barton, Adam Giacinto, and Micah Hale. 2023. Final Class III Cultural Resources Inventory Report for the Esmeralda Solar Energy Center Project, Esmeralda County, Nevada. Report # 6-3374 prepared by Dudek on behalf of Boulevard Associates LLC, for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

DeCourten, Frank, and Norma Biggar. 2017. *Roadside Geology of Nevada*. Mountain Press Publishing Company. Internet website: https://pubs.nbmg.unr.edu/Roadside-geology-of-Nevada-p/mp01.htm.

Drut, M. S., W. H. Pyle, and J. A. Crawford. 1994. "Diets and food selection of sage grouse chicks in Oregon." *Journal of Range Management* 47: 90–93.

EDDMapS (Early Detection and Distribution Mapping System). 2023. Distribution Maps. Internet website: https://www.eddmaps.org/distribution/.

EIA (US Energy Information Administration). 2019. Southwestern states have better solar resources and higher solar PV capacity factors. Internet website: https://www.eia.gov/todayinenergy/detail.php?id=39832#.

______. 2022. Solar explained. Internet website: https://www.eia.gov/energyexplained/solar/solar-energy-and-the-environment.php.

EPA (US Environmental Protection Agency). 2022. eGRID Data Explorer. Internet website: https://www.epa.gov/egrid/data-explorer.

______. 2023a. Criteria for the Definition of Solid Waste and Solid and Hazardous Waste Exclusions. Internet website: https://www.epa.gov/hw/criteria-definition-solid-waste-and-solid-and-hazardous-waste-exclusions#solidwaste.

______. 2023b. Greenhouse Gas Equivalencies Calculator. Internet website: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

______. 2023c. EPA's Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2021. Internet website: https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021.

Esmeralda County. 2011. Master Plan: Esmeralda County, Nevada. December 7, 2011. Internet website: http://cms2.revize.com/revize/esmeraldanew/document_center/Es__Co___Master_Plan_adopted_Dec__7__2011.pdf.

______. 2013. Esmeralda County Public Lands Policy Plan. Internet website: https://cms2.revize.com/revize/esmeraldanew/document_center/Es__Co__Public_Land_Policy_Plan_2013.pdf.

______. 2016. Esmeralda County, Nevada Local Hazard Mitigation Plan. July. Internet website: https://dem.nv.gov/uploadedFiles/demnvgov/content/About/2016_Esmeralda_County_LHMP.pdf.

Farr West Engineering. 2022. Esmeralda County Water Resource Plan. Updated December 15, 2022. Internet website: https://cms2.revize.com/revize/esmeraldanew/highlighted%2012-14-22%20-%208th_Draft_EC_Water_Resource_Plan_June_2022.pdf.

FEMA (Federal Emergency Management Agency). 2023. FEMA Flood Insurance Rate Maps. US Department of Homeland Security. Internet website: https://msc.fema.gov/portal/home.

FHWA (US Department of Transportation, Federal Highway Administration). 2006. Construction Noise Handbook, Final Report, August 2006. Internet website: https://www.fhwa.dot.gov/Environment/noise/construction_noise/handbook/.

FNA (Flora of North America). 2023. Flora of North America. Internet website: http://floranorthamerica.org/Main_Page.

Fontaine, Jeff. 2023. Central Nevada Regional Water Authority Update, February 2, 2023. Internet website: https://progressiverancher.com/central-nevada-regional-water-authority-update-2/.

Fowler, Catherine S., and Sven Liljeblad. 1986 "Northern Paiute." In *Handbook of North American Indians*, Volume 11: Great Basin, edited by Warren d'Azevedo. Smithsonian Institution, Washington, DC. Pp. 435–465.

Garside, Larry J., and Ronald H. Hess. 2011. Qualitative Petroleum Potential Map of Nevada. Nevada Bureau of Mines and Geology. Internet website: https://data.nbmg.unr.edu/public/freedownloads/geospatial-pdf/OF2011-02_plate.pdf.

Girão L. C., A. V. Lopes, M. Tabarelli, and E. M. Bruna. 2007. "Changes in tree reproductive traits reduce functional diversity in a fragmented Atlantic forest landscape." *PLoS ONE* 2(9): e908. doi:10.1371/journal.pone.0000908.

Gold Dust Solar LLC. 2021. Plan of Development, Gold Dust Solar, LLC, Project N-100357. Internet website: https://www.blm.gov/sites/default/files/docs/2021-09/nv-Gold-Dust-Solar-POD-2021.07.28.pdf.

Gorczyk, J., and S. Simpson. 2022. A Class III Archaeological Inventory for the Lone Mountain Solar Project, Esmeralda County, Nevada. Report #6-3371 by NewFields. Prepared for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

______. 2023. A Baseline Needs Cultural Resource Inventory for the Nivloc Solar Project, Esmeralda County, Nevada. Report #6-3371 by NewFields. Prepared for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

Graham, M., S. Ates, A. P. Melathopoulos, A. R. Moldenke, S. J. DeBano, L. R. Best, and C. W. Higgins. 2021. "Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem." *Scientific Reports* 11: 7452.

Guerin, T. F. 2017. "Evaluating expected and comparing with observed risks on a large-scale solar photovoltaic construction project: A case for reducing the regulatory burden." *Renewable and Sustainable Energy Reviews*, Pergamon, 23 Feb. 2017.

Guo, Y., J. Hu, R. Wang, S. Qu, L. Liu, and Li Zhiyong. 2023. "Study on the influence of sun glare on driving safety." *Building and Environment* 228: 109902.

Handman, E. H., and K. C. Kilroy. 1997. Ground-water Resources of Northern Big Smoky Valley, Lander and Nye Counties, Central Nevada. US Geological Survey Water-Resources Investigations Report 96-4311. Internet website: https://pubs.usgs.gov/wri/1996/4311/report.pdf.

Harrill, J. R., and D. E. Prudic. 1998. Aquifer Systems in the Great Basin Region of Nevada, Utah, and Adjacent States – Summary Report. US Geological Survey Professional Paper 1409-A. Internet website: https://pubs.usgs.gov/pp/1409a/report.pdf.

Henshaw, P. C. 1940. A Tertiary Mammalian Fauna from the San Antonio Mountain near Tonopah, Nevada: Ph. D. Dissertation, California Institute of Technology. Pasadena, California. Internet website: https://www.semanticscholar.org/paper/A-Tertiary-mammalian-fauna-from-the-San-Antonio-and-Henshaw/d489e2349499e88476caec9af941bfd04561a810.

Hoskins, Andrew, and Diane Winslow. 2023. Class III Cultural Resources Inventory for the Smoky Valley Solar Project, Esmeralda County, Nevada. Report #6-3391 prepared by SWCA Environmental Consultants on behalf of ConnectGen LLC for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

Howe, K. B., P. S. Coates, and D. J. Delehanty. 2014. "Selection of anthropogenic features and vegetation characteristics by nesting common ravens in the sagebrush ecosystem." *The Condor: Ornithological Applications* 116(1): 35–49.

Huckleberry, G., C. Beck, G. T. Jones, A. Holmes, M. Cannon, S. Livingston, and J. M. Broughton. 2001. "Terminal Pleistocene/Early Holocene environmental change at the Sunshine locality, NorthCentral Nevada, U.S.A." *Quaternary Research* 55: 303–312.

IMPLAN. 2023. IMPLAN model data for 2021 using inputs provided by the user and IMPLAN Group LLC, IMPLAN System (data and software), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078. Internet website: www.IMPLAN.com.

Inter-Tribal Council of Nevada. 1976. *Newe: A Western Shoshone History*. Inter-Tribal Council of Nevada, Reno.

Iosso, C. 2023. State of Nevada Wetland Program Plan, 2023–2028. Nevada Division of Natural Heritage. Prepared for the US Environmental Protection Agency, Region 9. May 9, 2023. Internet website: https://heritage.nv.gov/assets/documents/WPP_NV_2023_Final.pdf.

IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services). 2016. The Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on Pollinators, Pollination and Food Production (S. G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo, editors). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany.

IRHN (Intermountain Region Herbarium Network). 2023. Search Collections. Internet website: https://intermountainbiota.org/portal/collections/index.php?catid=1.

Jepson Flora Project. 2023. The Jepson Flora Project. Internet website: https://ucjeps.berkeley.edu/jepsonflora/.

Johnson, G. D., and M. S. Boyce. 1990. "Feeding trials with insects in the diet of sage grouse chicks." *Journal of Wildlife Management* 54: 89–91.

Kenny, J. F, N. L. Barber, S. S. Hutson, K. S. Linsey, J. Lovelace, and M. A. Maupin. 2009. Estimated Use of Water in the United States in 2005, US Geological Survey, Circular 1344. Internet website: http://pubs.usgs.gov/circ/1344.

Klebenow, D. A., and G. M. Gray. 1968. "Food habits of juvenile sage grouse." *Journal of Range Management* 21: 80–83.

Kleinfelder, D. A. 2022a. Preliminary Water Supply Assessment, Red Ridge 1 Solar Project, Esmeralda County, Nevada. December 19, 2022.

______. 2022b. Preliminary Water Supply Assessment, Red Ridge 2 Solar Project, Esmeralda County, Nevada. December 19, 2022.

Kosciuch, K., D. Riser-Espinoza, M Gerringer, and W. Erickson. 2020. "A summary of bird mortality at photovoltaic utility scale solar facilities in the Southwestern US." *PloS one* 15(4): p.e0232034.

Kovacs, Robert. 2022. Preliminary Water Supply Assessment, Red Ridge 1 Solar Project, Esmeralda County, Nevada.

Kroesen, M., E. J. Molin, and B. van Wee. 2008. "Testing a theory of aircraft noise annoyance: A structural equation analysis." *The Journal of the Acoustical Society of America*. Internet website: https://doi.org/10.1121/1.2916589.

Lennartsson, T. 2002. "Extinction thresholds and disrupted plant–pollinator interactions in fragmented plant populations." *Ecology* 83(11): 3060–3072.

Lopes, T. J., and D. M. Evetts. 2005. Ground-Water Pumpage and Artificial Recharge Estimate for Calendar Year 2000 and Average Annual Natural Recharge and Interbasin Flow by Hydrographic Area, Nevada. USGS Scientific Investigations Report 200-5239. January. Internet website: https://pubs.usgs.gov/sir/2004/5239/.

Lovich, J. E., and J. R. Ennen. 2011. "Wildlife conservation and solar energy development in the desert southwest, United States." *BioScience* 61(12): 982–992.

Meinzer, O. E. 1917. Geology and Water Resources of Big Smoky, Clayton, and Alkali Spring Valleys, Nevada. USGS Water-Supply Paper 423. P. 208. Internet website: https://pubs.usgs.gov/wsp/0423/report.pdf.

Michigan State University. 2002. K Factor. Institute of Water Research. Internet website: http://www.iwr.msu.edu/rusle/kfactor.htm.

Mifflin, M. D. 1968. Delineation of Ground-Water Flow System in Nevada. Technical Report Series H-W Hydrology and Water Resources Publication No. 4. Enter for Water Resources Research, Desert Research Institute, University of Nevada System, Reno. July. Internet website: https://www.nrc.gov/docs/ML0330/ML033030350.pdf.

Miller, J. 1983. "Basin religion and theology: A comparative study of power (Puha)." *Journal of California and Great Basin Anthropology* 5(1 and 2): 66–86.

Miller, W. R. 1986 "Numic Languages." In: Great Basin, Vol. 11, edited by W. L. d'Azevedo. *Handbook of North American Indians*, W. G. Sturtevant, general editor. Smithsonian Institution, Washington, DC.

Monsen, S. B., R. Stevens, and N. Shaw. 2004. "Grasses." In "Restoring western ranges and wildlands" (S. B. Monsen, R. Stevens, and N. L. Shaw, compilers). General Technical Report RMRSGTR-136-vol-2. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado. Pp. 295–424.

Morefield, J. D. 2001. Nevada Rare Plant Atlas. Nevada Natural Heritage Program, Carson City, Nevada. Internet website: https://heritage.nv.gov/documents/nevada-rare-plant-atlas.

NatureServe. 2023. NatureServe Explorer. Internet website: https://explorer.natureserve.org/.

NBMG (Nevada Bureau of Mines and Geology). 1964. Bulletin 65 Mineral and Water Resources of Nevada. University of Nevada, Reno. Internet website: http://www.nbmg.unr.edu/dox/b65.pdf.

NDEP (Nevada Division of Environmental Protection). 2017. Overview of Permitting Programs and Requirements. Internet website: https://ndep.nv.gov/uploads/water-wpc-permitting-individual-npdes-docs/discharge-permit-overview-2017.pdf.

_____. 2019. Nevada Statewide Greenhouse Gas Emissions Inventory and Projections 1990-2042. Internet website: https://ndep.nv.gov/uploads/air-pollutants-docs/ghg_report_2021.pdf.

______. 2022. Nevada 2020–2022 Water Quality Integrated Report. Internet website: http://webgis.ndep.nv.gov/.

NDNH (Nevada Division of Natural Heritage). 2023a. At-Risk Plant and Animal Tracking List, January 2023. Carson City, Nevada.

______. 2023b. Plant and Animal Watch List, January 2023. Carson City, Nevada.

______. 2023c. Species Explorer Tool. Internet website: http://species.heritage.nv.gov/.

NDPBH (State of Nevada, Health and Human Services, Division of Public and Behavioral Health). 2023. HPSA scores for Nevada counties. Internet website: https://dpbh.nv.gov/Programs/HPSA/Health_Professional_Shortage_Area_Designations_-_Home/.

NDOM (Nevada Division of Minerals). 2023. Nevada Oil, Gas, and Geothermal. Internet website: https://data-ndom.opendata.arcgis.com/pages/oilgasandgeothermalproduction.

NDOT (Nevada Department of Transportation). 2022a. Available Annual Traffic Reports: Esmeralda. Internet website: https://www.dot.nv.gov/home/showpublisheddocument/21762/638206014113700000.

______. 2022b. Traffic Records Information Access (TRINA). Internet website: https://ndot.maps.arcgis.com/apps/webappviewer/index.html?id=278339b4605e4dda8da9bddd2fd9f1e9.

NDOW (Nevada Department of Wildlife). 2022. Nevada Big Game Status: Management Area Reports, Statewide Summary, Harvest Data, 2021-2022. Internet website: https://www.ndow.org/wp-content/uploads/2022/07/2021-2022-Big-Game-Status-Book.pdf.

______. 2023a. Desert Bighorn Sheep Hunt Information Sheet. Internet website: https://www.ndow.org/wp-content/uploads/2022/01/Desert-Bighorn-Sheep-212.pdf.

______. 2023b. Mule Deer Hunt Information Sheet. Internet website: https://www.ndow.org/wp-content/uploads/2022/01/Mule-Deer-211-213.pdf.

______. 2023c. Pronghorn Antelope Hunt Information Sheet. Internet website: https://www.ndow.org/wp-content/uploads/2022/01/Pronghorn-Antelope-211-213.pdf.

NDT (Nevada Department of Taxation). 2021. Nevada County Population Projections 2021 to 2040. Reno, Nevada. Internet website: https://tax.nv.gov/uploadedFiles/taxnvgov/Content/TaxLibrary/Nevada%20County%20Population%20Projections%202021%20to%202040.pdf.

NDWR (Nevada Division of Water Resources). 2024. Hydrographic Area Summaries for Big Smoky Valley, Clayton Valley, Fish Lake Valley, Crescent Valley, and Columbus Salt Marsh Valley. Internet website: http://water.nv.gov/undergroundactive.aspx.

NewFields. 2022a. Vegetation and Soils Report Lone Mountain Solar Project. Las Vegas, Nevada.

______. 2022b. Esmeralda Solar Avian Point-Count Surveys. Las Vegas, Nevada.

Nivloc Solar Energy. 2021. Nivloc Solar Energy Project Preliminary Plan of Development. Internet website: https://www.blm.gov/sites/default/files/docs/2021-09/nv-Nivloc%20Solar%20Energy-BLM%20Application%2020210414%28PPOD-REVISED%29.pdf.

NPS (US Department of the Interior, National Park Service). 1995. How to Apply the National Register Criteria for Evaluation. Internet website: https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf.

NRCS (US Department of Agriculture, Natural Resources Conservation Service). 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. US Department of Agriculture Handbook 296. Washington, DC.

______. 2009. Plants for Saline to Sodic Soil Conditions. TN Plant Materials NO. 9A. Internet website: https://www.nrcs.usda.gov/plantmaterials/idpmstn5465.pdf.

______. 2017. Rangeland Soil Quality: Compaction. Internet website: https://www.nrcs.usda.gov/sites/default/files/2022-2/Rangeland_Soil_Quality_Compaction_0.pdf.

______. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. US Department of Agriculture, Agriculture Handbook 296. Washington, DC.

______. 2023a. Web Soil Survey. Internet website: http://websoilsurvey.sc.egov.usda.gov/.

______. 2023b. Custom Soil Resource Report for Esmeralda County Area, Nevada, Esmerelda 7 Planning Area. Available on file at the Bureau of Land Management Battle Mountain District Office, Battle Mountain, Nevada.

Nye County. 2012. Community Source Water Protection Plan for Public Water Systems in Nye County, Nevada. November. Internet website: https://www.nyecountywaterdistrict.net/DocumentCenter/View/181/Water-Protection-Plan-Nye-County-2012?bidId=.

Olivera, J. M., L. A. Rocha, V. I. Rotger, and M. C. Herrera. 2011. "Acoustic pollution in hospital environments." *Journal of Physics: Conference Series* 332(2011): 012003. Internet website: https://doi.org/10.1088/1742-6596/332/1/012003.

Pagel, J. E., D. M. Whittington, and G. T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. Internet website: https://tethys.pnnl.gov/sites/default/files/publications/Pagel-2010.pdf.

Pellant, M., P. L. Shaver, D. A. Pyke, N. Lepak, G. Riegel, J. E. Herrick, E. Kachergis, et al. 2020. Interpreting Indicators of Rangeland Health, Version 5. Tech Ref 1734-6. US Department of Interior, BLM, National Operations Center, Denver, Colorado.

Peterson, J. G. 1970. "The food habits and summer distribution of juvenile sage-grouse in central Montana." *Journal of Wildlife Management* 34: 147–155.

Pierce, I. 2021. Tectonic mystery swirls as earthquake rocks California-Nevada border. Internet website: Tectonic mystery swirls as earthquake rocks California-Nevada border - Temblor.net.

Pyle, W. H. 1993. "Response of brood-rearing habitat of sage-grouse to prescribed burning in Oregon." Master's thesis, Oregon State University, Corvallis.

Robinson, P. T., J. H. Stewart, R. J. Moiola, and J. P Abers. 1976. Geological Map of the Rhyolite Ridge Quadrangle, Esmeralda County, Nevada, Geological Quadrangle Map GQ-1325.

Rose, T., and A. Wollert. 2015. "The dark side of photovoltaic—3D simulation of glare assessing risk and discomfort." *Environmental Impact Assessment Review* 52: 24–30.

Rosentreter, R., M. Bowker, and J. Belnap. 2007. A Field Guide to Biological Soil Crusts of Western US Drylands. US Government Printing Office, Denver, Colorado.

Rush, F. E., and C. V. Schroer. 1971. Water Resources of Big Smoky Valley, Lander, Nye, and Esmeralda Counties, Nevada. Nevada Division of Water Resources Bulletin No. 41. Internet website: http://images.water.nv.gov/images/publications/water%20resources%20bulletins/Bulletin41.pdf.

Soil Science Division Staff. 2017. Soil survey manual. C. Ditzler, K. Scheffe, and H.C. Monger (eds.). USDA Handbook 18. Government Printing Office, Washington, DC.

Solfisburg, Christian, and Shannon S. Mahoney. 2023a. Class III Cultural Resources Inventory for the Red Ridge 1 Solar Project, Esmeralda County, Nevada. Report #6-3368 prepared by Stantec on behalf of 335ES 8me LLC for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

______. 2023b. Class III Cultural Resources Inventory for the Red Ridge 2 Solar Project, Esmeralda County, Nevada. Report #6-3368 prepared by Stantec on behalf of 336SP 8me LLC for Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

Spring Stewardship Institute. 2023. Springs Online: The Springs and Springs-Dependent Species Database. Springs Stewardship Institute Flagstaff, Arizona. Internet website: https://springsdata.org/.

Stallen, P. J. A. 1999. "Theoretical framework for environmental noise annoyance." *Noise Health* 1: 69−80. Internet website: https://pubmed.ncbi.nlm.nih.gov/12689501/.

Stantec (Stantec Consulting Services Inc.). 2022a. Botany Survey Report, Red Ridge 1 and Red Ridge 2 Solar Projects, Esmeralda County, Nevada. Reno, Nevada.

______. 2022b. Migratory Bird Survey Summary, Red Ridge 1 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022c. Migratory Bird Survey Summary, Red Ridge 2 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022d. Burrowing Owl Survey Report Red Ridge 1 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022e. Burrowing Owl Survey Report Red Ridge 2 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022f. Pale Kangaroo Mouse Desktop and Field Report Red Ridge 1 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022g. Pale Kangaroo Mouse Desktop and Field Report Red Ridge 2 Solar Project Esmeralda County, Nevada. Reno, Nevada.

______. 2022h. Phase I Environmental Site Assessment Red Ridge 1 Solar Project Esmeralda County, Nevada.

______. 2022i. Phase I Environmental Site Assessment Red Ridge 2 Solar Project Esmeralda County, Nevada.

Stebbins, Robert C. 2003. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin Company, New York.

Steward, Julian H. 1937. "Linguistic distributions and political groups of the Great Basin Shoshoneans." *American Anthropologist* 39(4): 625–634.

______. 1938. Basin-plateau Aboriginal Sociopolitical Groups. Reprinted by the University of Utah Press: Salt Lake City 1997 ed. Vol. Bulletin 120. Bureau of American Ethnology. Washington, DC: Smithsonian Institution Bureau of American Ethnology, United States Government Printing Office.

______. 1970. Basin-Plateau Aboriginal Sociopolitical Groups. Smithsonian Institution, Bureau of American Ethnology Bulletin 120. Washington, DC, 1938 Reprint, Salt Lake City: University of Utah Press, 1970.

Stewart, J. H., and J. E. Carlson. 1978. Digitalized geologic map of Nevada, scale: 1:500,000. Prepared by the US Geological Survey in cooperation with the Nevada Bureau of Mines and Geology. Internet website: https://gisweb.unr.edu/nbmg/rest/services/Geology/NV_500k_Geology/MapServer.

Stewart, J. H., P. C. Kelleher, and E. A. Zorich. 1994. Geological map of the Monte Cristo Range area, Esmeralda and Mineral Counties, Nevada. Map 1:62,500. Internet website: https://pubs.usgs.gov/mf/1994/2260/report.pdf.

Sturtevant, W. G. 1986. *Handbook of North American Indians: Great Basin, Vol. 11*. Smithsonian Institution, Washington, DC.

Sullivan, R., N. Glines-Bovio, K. N. Rogers, J. H. McCarty, D. Korzilius, and H. Hartmann. 2023. Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Lands. Tech Note 457. US Department of the Interior, Bureau of Land Management, National Operations Center, Denver, Colorado.

SWCA (SWCA Environmental Consultants). 2023. Botanical Resource Survey Report for the Smoky Valley Solar Project. Reno, Nevada.

Taghavifar, H., and A. Mardani. 2014. "Effect of velocity, wheel load and multipass on soil compaction." *Journal of Saudi Society of Agricultural Sciences* 13(1): 57–66.

Tawalbeh, M., A. Al-Othman, F. Kafiah, E. Abdelsalam, F. Almoromani, and M. Alkasrawi. 2021. "Environmental impacts of solar photovoltaic systems: A critical review of recent progress and future outlook." *Science of The Total Environment*, Elsevier, 16 Nov. 2020.

Thomas, David Hurst, Lorann S. A. Pendleton, and Stephen C. Cappannari. 1986. Western Shoshone. In *Handbook of North American Indians - Great Basin*, edited by Warren L. d'Azevedo. Smithsonian Institution, Washington, DC. Pp. 262–283.

Trinity Consultants. 2024. Air Dispersion Modeling Analysis. April 2024. Prepared for the Bureau of Land Management, Battle Mountain District, Tonopah Field Office. Battle Mountain, Nevada.

US Census Bureau. 2010a. Decennial Census. Table P1, Total Population. 2010 Census Summary File 1. Internet website: https://data.census.gov/table?t=Population+Total&g=040XX00US06,32_050XX00US06027,06051,32009,32019,32021,32023&d=DEC+Summary+File+1&tid=DECENNIALSF12010.P1.

______. 2010b. American Community Survey 5-year Data 2006–2010 from the Demographic Profile for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2020. Decennial Census. Table P1, Total Population. 2020 Census Summary File 1. Internet website: https://data.census.gov/table?t=Populations+and+People&g=040XX00US06,32_050XX00US06027,06051,32009,32019,32021,32023&y=2020&d=DEC+Demographic+and+Housing+Characteristics&tid=DECENNIALDHC2020.P1.

______. 2021a. American Community Survey 5-year Data 2017–2021. Table DP05. Internet website: https://data.census.gov/table?text=DP05&g=040XX00US06,32_050XX00US06027,06051,32009,32019,32021,32023&tid=ACSDP5Y2021.DP05&moe=false&tp=false.

______. 2021b. American Community Survey 5-year Data 2017–2021. Table S1701. Internet website: https://data.census.gov/table?text=S1701&g=040XX00US06,32_050XX00US06027,06051,32009,32019,32021,32023&tid=ACSST5Y2021.S1701&moe=false.

______. 2021c. American Community Survey 5-year Data 2017–2021 from the Demographic Profile for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2021d. American Community Survey 5-year Data 2017–2021 from the Demographic Profile for California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2021e. American Community Survey 5-year Data 2017–2021. Table B25014 Tenure by Occupants per Room. Internet website: https://data.census.gov/table?q=B25014&g=040XX00US06,32_050XX00US06027,06051,32009,32019,32021,32023&tid=ACSDT5Y2021.B25014.

______. 2022a. Population Trends for Selected Counties in California and Nevada, reported by Headwaters Economics' Economic Profile System. Internet website: https://headwaterseconomics.org/apps/economic-profile-system/.

______. 2022b. Poverty Thresholds for 2021 by Size of Family and Number of Related Children Under 18 Years. Internet website: https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html.

US Census GIS (US Census Geographic Information Systems). 2022. TIGER/Line Shapefiles: Roads. Internet website: https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2022&layergroup=Roads.

US Solar Assets. 2021. Plan of Development Esmeralda Solar Project. Internet website: https://www.blm.gov/sites/default/files/docs/2021-09/NV%20Leeward-Esmeralda%20-%20POD%20-%20AUG%2025%202021.pdf.

USACE (US Army Corp of Engineers). n.d. Cowardin Codes for ORM Data Entry. Internet website: https://www.spa.usace.army.mil/Portals/16/docs/civilworks/regulatory/Bulk%20Upload/Bulk%20Data%20Cowardin.pdf.

USDA (US Department of Agriculture). 2016. Revised Universal Soil Loss Equation 2 - How RUSLE2 Computes Rill and Interrill Erosion. Internet website: https://www.ars.usda.gov/southeast-area/oxford-ms/national-sedimentation-laboratory/watershed-physical-processes-research/research/rusle2/revised-universal-soil-loss-equation-2-how-rusle2-computes-rill-and-interrill-erosion/.

USFWS (US Fish and Wildlife Service). 2013. Federal Geographic Data Committee. Classification of Wetlands and Deepwater Habitats of the United States. Internet website: https://www.fws.gov/sites/default/files/documents/wetlands-and-deepwater-map-code-diagram.pdf.

______. 2021. Birds of Conservation Concern 2021. United States Department of the Interior, US Fish and Wildlife Service, Migratory Birds, Falls Church, Virginia.

USGS (United States Geological Survey). 2003. Ecoregions of Nevada. Internet website: http://www.ecologicalregions.info/data/nv/nv_front.pdf.

______. 2005. National Gap Analysis Program: Southwest Regional Gap Analysis Project—Land Cover Descriptions. RS/GIS Laboratory, College of Natural Resources, Utah State University.

______. 2007. National Gap Analysis Program. Digital Animal-Habitat Models for the Southwestern United States. Version 1.0. Center for Applied Spatial Ecology, New Mexico Cooperative Fish and Wildlife Research Unit, New Mexico State University, Las Cruces.

______. 2020. Earthquake Hazards Program. M 6.5 - Monte Cristo Range, NV Earthquake. May 15, 2020. Internet website: https://earthquake.usgs.gov/earthquakes/eventpage/nn00725272/executive.

______. 2023. National Hydrography Dataset. Internet website: https://www.usgs.gov/national-hydrography/access-national-hydrography-products.

USGS and NDWR (United States Geological Survey and Nevada Division of Water Resources). 1970. Water-resources appraisal of the Columbus Salt Marsh–Soda Spring Valley, Nevada: Nevada Division of Water Resources Reconnaissance Report Resource 52. Internet website: http://images.water.nv.gov/images/publications/recon%20reports/rpt52-soda_spring_valley.pdf.

Walker, R. F., and W. S. Motts. 1969. Chapter 4: Reconnaissance Geology of Big Smoky Playa, Nevada, in Motts, W. S., ed., Geology and Hydrology of Selected Playas in Western United States. University of Massachusetts Final Scientific Report (Part II). Internet website: https://apps.dtic.mil/sti/tr/pdf/AD0709683.pdf.

WAPT (Wildlife Action Plan Team). 2013. Nevada Wildlife Action Plan. Nevada Department of Wildlife, Reno, Nevada.

Warren, S. D., R. Rosentreter, and N. Pietrasiak. 2021. "Biological soil crusts of the Great Plains: A review." *Rangeland & Ecology Management* 78: 213–219.

Wei, S., K. Zhang, C. Liu, Y. Cen, and J. Xia. 2023. "Effects of different vegetation components on soil erosion and response to rainfall intensity under simulated rainfall." *CATENA* 235: 107652.

Weil, R. R., and N. C. Brady. 2019. *Elements of the Nature and Properties of Soils*, Fourth Edition. Pearson, New York, New York.

Westwood. 2022a. Red Ridge 1 Preliminary Hydrology Study, Red Ridge 1 Solar Project, Esmeralda County, Nevada. June 29, 2022.

______. 2022b. Red Ridge 2 Preliminary Hydrology Study, Red Ridge 2 Solar Project, Esmeralda County, Nevada. June 29, 2022.

WRCC (Western Regional Climate Center). 2023. Coaldale Junction, Nevada Period of Record Monthly Climate Summary. Internet website: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?nv1755.

Xerces (Xerces Society for Invertebrate Conservation). 2018. Establishing Pollinator and Beneficial Insect Habitat on Organic Farms in Idaho An Installation Guide for Meadows and Hedgerows. Portland, Oregon.

Zobeck, T. M., and R. S. Van Pelt. 2014. Wind Erosion. Internet website: https://digitalcommons.unl.edu/usdaarsfacpub/1409/?utm_source=digitalcommons.unl.edu%2Fusdaarsfacpub%2F1409&utm_medium=PDF&utm_campaign=PDFCoverPages.

Glossary

Acquired lands: Lands in federal ownership that are not public domain and that have been obtained by the government by purchase, condemnation, gift, or exchange. Acquired lands are normally dedicated to a specific use or uses.

Active nest site: A raptor nest site that is currently occupied by a pair of breeding raptors.

Affected environment: For an EIS, a description of the existing environment covering information necessary to assess or understand the impacts. It must contain enough detail to support the impact analyses and must highlight environmentally sensitive resources (such as floodplains, wetlands, threatened and endangered species, and archaeological resources).

Air quality classes: Classifications established under the Prevention of Significant Deterioration portion of the Clean Air Act, which limits the amount of air pollution considered significant within an area. Class I applies to areas where almost any change in air quality would be significant; Class II applies to areas where the deterioration normally accompanying moderate, well-controlled growth would be insignificant; and Class III applies to areas where industrial deterioration would generally be insignificant.

Allotment: An area of land in which one or more livestock operators graze their livestock. Allotments generally consist of BLM-administered lands, but they may include other federally managed, state-owned, and private lands. An allotment may include one or more separate pastures. Livestock numbers and periods of use are specified for each allotment.

Alluvium: Clay, silt, sand, gravel, or other rock materials transported by moving water. They were deposited in comparatively recent geological time as sorted or semi-sorted sediment in rivers, floodplains, lakes, and shores, and in fans at the base of mountain slopes.

Alternating current (AC): An electric current that reverses its direction at regularly recurring intervals.

Ambient air quality: The state of the atmosphere at ground level as defined by the range of measured and predicted ambient concentrations of all significant pollutants for all averaging periods of interest.

Animal unit month (AUM): The amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month.

Aquatic: Living or growing in or on the water.

Areas of critical environmental concern (ACECs): Areas defined by the Federal Land Policy and Management Act of 1976 as having significant historical, cultural, and scenic values; habitat for fish and wildlife; and other public land resources, as identified through the BLM's land use planning process. The BLM manages these areas.

Arid: A region that receives too little water to support agriculture without irrigation. Less than 10 inches of rainfall a year is typically considered arid.

Authorized/authorized use: Typically, a commercial activity, facility placement, or event occurring on public lands that is either explicitly or implicitly recognized and legalized by law or regulation. This term may refer to those activities occurring on public lands for which the BLM or other appropriate authority has issued a formal authorization document. These formally authorized uses are often spatially or temporally limited, unless constrained or bounded by statute, regulation, or an approved land use plan decision.

Average annual daily traffic (AADT): A measurement representing the total number of vehicles passing a given location, based on 24-hour counts taken over an entire year. Mechanical counts are adjusted to an estimate of annual average daily traffic figures, taking into account seasonal variance, weekly changes, and other variables.

Battery: Two or more electrochemical cells enclosed in a container and electrically interconnected in an appropriate series and/or parallel arrangement to provide the required operating voltage and current levels. Under common usage, the term "battery" also applies to a single cell if it constitutes the entire electrochemical storage system.

Battery capacity: The maximum total electrical charge, expressed in ampere-hours, that a battery can deliver to a load under a specific set of conditions.

Best management practice (BMP): A method, process, or activity, or usually a combination of these, determined by a state or a designated planning agency to be the most effective and practicable means (including technological, economic, and institutional considerations) of managing or controlling particular conditions or circumstances.

Big game: Indigenous, ungulate (hoofed) wildlife species that are hunted, such as elk, deer, bison, bighorn sheep, and pronghorn.

Biological soil crust: A complex association between soil particles and cyanobacteria, algae, microfungi, lichens, and bryophytes that live within or atop the uppermost millimeters of soil.

Bird conservation regions (BCRs): Ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues. The overall goal of BCRs is to accurately identify the migratory and resident bird species (beyond those already designated as federally threatened or endangered) that represent the highest conservation priorities by ecoregion.

Bureau of Land Management (BLM): An agency of the US Department of the Interior that is responsible for managing public lands.

Candidate species: Taxa for which the US Fish and Wildlife Service has sufficient information on their status and threats to propose the species for listing as endangered or threatened under the Endangered Species Act, but for which issuance of a proposed rule is currently precluded by higher-priority listing actions. Separate lists for plants, vertebrate animals, and invertebrate animals are published periodically in the *Federal Register*.

Carbon dioxide (CO_2): A colorless, odorless, nonpoisonous gas that is a normal part of the earth's atmosphere. Carbon dioxide is a product of fossil fuel combustion and other processes. It is the most prominent GHG that traps heat radiated into the atmosphere.

Carbon monoxide (CO): A colorless, odorless gas that is toxic if breathed in high concentrations over an extended period of time. Carbon monoxide is listed as a criteria air pollutant under Title I of the Clean Air Act.

Class I area: As defined in the Clean Air Act, the following areas that were in existence as of August 7, 1977: national parks with more than 6,000 acres, national wilderness areas, national memorial parks with more than 5,000 acres, and international parks.

Class II area: Areas of the country protected under the Clean Air Act but identified for somewhat less stringent protection from air pollution damage than a Class I area, except in specified cases.

Clean Air Act (CAA): The comprehensive federal law that regulates air emissions. The goal of the law was to develop national ambient air quality standards (NAAQS) that protect public health and the environment. The original CAA was passed in 1963, but the national air pollution control program is based on the 1970 version of the law. The 1990 CAA amendments, in large part, were intended to deal with previously unaddressed or under-addressed problems, such as acid rain, ground-level ozone, ozone depletion, and air toxics.

Clean Water Act (CWA): An act that requires National Pollutant Discharge Elimination System permits for discharges of effluents to surface waters, permits for stormwater discharges related to industrial activity, and notification of oil discharges to navigable waters of the United States.

Climate: The composite or generally prevailing weather conditions of a region throughout the year, averaged over a series of years.

Construction: The phase of an authorization in which facilities, such as roads, pipelines, and transmission lines, are built on public land.

Contrast: Opposition or unlikeness of different forms, lines, colors, or textures in a landscape.

Contrast level: A description of the relative amount of visual contrast resulting from a change in the visible landscape. Contrast levels define the degree to which a management activity affects the visual quality of a landscape, and they provide a means for determining visual impacts and for identifying measures to mitigate these impacts. Contrast levels are determined as part of the visual contrast rating procedures the BLM uses to analyze potential visual impacts of proposed projects and activities. In the visual contrast rating process, contrast levels are defined as none, weak, moderate, or strong.

Cooperating agency: An agency that assists the lead federal agency in developing an environmental assessment or EIS. A cooperating agency can be any agency with jurisdiction by law or special expertise for proposals covered by NEPA. Any tribe or federal, state, or local government jurisdiction with such qualifications may become a cooperating agency by agreement with the lead agency.

Council on Environmental Quality (CEQ): An advisory council to the president of the US established by NEPA. It reviews federal programs to analyze and interpret environmental trends and information.

Criteria air pollutants: Six common air pollutants for which national ambient air quality standards (NAAQS) have been established by the US EPA under Title I of the CAA. These are sulfur dioxide, nitrogen oxides, carbon monoxide, ozone, particulate matter ($PM_{2.5}$ and PM_{10}), and lead. Standards were developed for these pollutants based on scientific knowledge about their health effects.

Critical habitat: (1) The specific areas within the geographic area currently occupied by a species, at the time it is listed in accordance with the Endangered Species Act, on which are found those physical or biological features essential to the conservation of the species and that may require special management considerations or protection, and (2) specific areas outside the geographic area occupied by a species at the time it is listed upon determination by the US Fish and Wildlife Service and/or National Marine Fisheries Service that such areas are essential for the conservation of the species. Critical habitats are designated in 50 CFR 17 and 226. The constituent elements of critical habitat are those physical and biological features of designated or proposed critical habitat essential to the conservation of the species, including, but not limited to, (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and (5) habitats that are protected from disturbance or are representative of the historical geographic and ecological distributions of a species.

Cultural resources: Locations of human activity, occupation, or use. Cultural resources include archaeological, historic, or architectural sites, structures, or places with important public and scientific uses, and locations of traditional cultural or religious importance to social and/or cultural groups.

Cumulative effects: Effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time.

Decibel (dB): A standard unit for measuring the loudness or intensity of sound. In general, a sound doubles in loudness with every increase of 10 decibels.

Decibel, A-weighted (dBA): A measurement of sound approximating the sensitivity of the human ear and used to characterize the intensity or loudness of a sound.

Decommissioning: All activities necessary to take out of service and dispose of a facility after its useful life.

Design features: Measures or procedures incorporated into the proposed action or alternatives that could avoid or reduce adverse impacts. Potential mitigation measures selected as required are then considered to be design features.

Direct current (DC): A steady current that flows in one direction only. The current from batteries is an example of direct current.

Direct effects: Effects on the environment that occur at the same time and place as the initial cause or action.

Dry lake: An ephemeral lake of an arid or semiarid region, typically found at low-elevation points in desert valleys. These lakes are topographically flat areas; they support sparse vegetation, and contain fine-grained, consolidated sediments that are deposited during precipitation runoff events where the water temporally ponds and then infiltrates to groundwater aquifers or evaporates. The surface sediments of dry lakes can often have high concentrations of dissolved minerals.

Ecological site: A distinctive kind of land with specific soil and physical characteristics that differ from other kinds of land in the land's ability to produce a distinctive kind and amount of vegetation and its ability to respond similarly to management actions and natural disturbances. Ecological site descriptions synthesize information and data pertaining to the soils, hydrology, ecology, and management of the ecological site.

Ecoregions: Geographic areas delineated and defined by similar climatic conditions, geomorphology, and soils.

Effects: Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place, or indirect, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable, or cumulative.

Emissions: Substances that are discharged into the air from industrial processes, vehicles, and living organisms. A release into the outdoor atmosphere of air contaminants.

Endangered species: Any species (plant or animal) that is in danger of extinction throughout all or a significant part of its range. Requirements for declaring a species endangered are found in the Endangered Species Act of 1973.

Endangered Species Act of 1973 (ESA): Requires consultation with the US Fish and Wildlife Service and/or the National Marine Fisheries Service to determine whether endangered or threatened species or their habitats would be impacted by a proposed activity and what, if any, mitigation measures are needed to address the impacts.

Environmental impact statement (EIS): A detailed statement prepared by the responsible official in which a major federal action that significantly affects the quality of the human environment is described, alternatives to the proposed action are provided, and effects are analyzed.

Environmental justice (EJ): The fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Ephemeral stream: A stream that flows only after a storm or during snowmelt, and whose channel is, at all times, above the water table; groundwater is not a source of water for the stream. Many desert streams are ephemeral.

Erosion: The wearing away of land surface by wind or water. Erosion is intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging.

Executive order: A president's or governor's declaration that has the force of law, usually based on existing statutory powers, and requiring no action by Congress or the state legislature.

Existing routes: The roads, trails, or ways that are used by motorized vehicles (for example, jeeps, all-terrain vehicles, and motorized dirt bikes), mechanized uses (for example, mountain bikes, wheelbarrows, and game carts), pedestrians (for example, hikers), and/or equestrians and are, to the best of the BLM's knowledge, in existence at the time of RMP/EIS publication.

Extensive recreation management area (ERMA): An administrative unit that requires specific management consideration to address recreation use, demand, or recreation and visitor services program investments. ERMAs are managed to support and sustain the principal recreational activities and the associated qualities and conditions of the ERMA. ERMA management is commensurate and considered in context with the management of other resources and resource uses.

Federal Land Policy and Management Act of 1976 (FLPMA): Act requiring the Secretary of the Interior to issue regulations to manage public lands and the property located on those lands for the long term.

***Federal Register*:** The official daily publication for rules, proposed rules, and notices of federal agencies and organizations, as well as executive orders and other presidential documents.

Floodplain: A generally flat, low-lying area adjacent to a waterbody that is subjected to inundation during high-flow or rainfall events. The relative elevation of floodplain areas determines their frequency of flooding, which ranges from rare, severe storm events to flows experienced several times a year.

Fossil: Remains of ancient life forms, their imprints or behavioral traces (for example, tracks, burrows, or residues), and the rocks in which they are preserved.

Fugitive dust: The dust released from any source other than a definable point source, such as a stack, chimney, or vent. Common sources include construction activities, storage piles, and roadways.

Geographic information system (GIS): A computer system for performing a geographic analysis. GIS has four interactive components: an input subsystem for converting into digital form (digitizing) maps and other spatial data; a storage and retrieval subsystem; an analysis subsystem; and an output subsystem for producing maps, tables, and answers to geographic queries.

Government-to-government consultation: Communication between the tribal council, or council member designated to represent the council, and an appointed line officer of the BLM who is knowledgeable about the project and who is authorized to speak for the federal government.

Greenhouse gases (GHGs): Heat-trapping gases that cause global warming. Natural and human-made GHGs include water vapor, carbon dioxide, methane, nitrogen oxides, ozone, and chlorofluorocarbons.

Groundwater: The supply of water found beneath the earth's surface, usually in porous rock formations (aquifers), which may supply wells and springs. Generally, it refers to all water contained in the ground.

Hazardous material: A substance, pollutant, or contaminant that, due to its quantity, concentration, or physical or chemical characteristics, poses a potential hazard to human health and safety or to the environment, if it is released into the workplace or the environment.

Herd area: An area that contained wild horses or burros that was inventoried and mapped based on the requirements set forth with passage of the Wild Free-Roaming Horses and Burros Act of 1971.

Herd management area (HMA): Public land under the BLM's jurisdiction that has been designated for special management emphasizing the maintenance of an established wild horse or burro herd.

Historic: The time period after the appearance of written records. This generally refers to the time period after the beginning of European settlement at approximately AD 1600.

Indirect effects: Secondary effects that occur in locations other than the initial action or that occur significantly later in time.

Intermittent stream: A stream where portions flow continuously only at certain times of the year (for example, when it receives water from a spring, groundwater source, or surface source, such as melting snow). At low flow, there may be dry segments alternating with flowing segments.

Invasive species: Any species, including noxious and exotic species, that is an aggressive colonizer and can outcompete indigenous species.

Invertebrate: An animal that does not possess or develop a vertebral column (a backbone or spine).

Inverter: An electrical device that converts direct current (DC) into alternating current (AC).

Key observation point(s) (KOPs): One or a series of points on a travel route, at a use area, or at a potential use area where the view of a management activity would be most revealing. KOPs are typically used as viewpoints for assessing potential visual impacts resulting from a proposed management activity.

Kilowatt: A unit of electrical power equal to 1,000 watts.

Land use plan: A set of decisions that establish management direction for land within an administrative area, as prescribed under the planning provisions of FLPMA; an assimilation of land-use-plan-level decisions developed through the planning process outlined in 43 CFR 1600, regardless of the scale at which the decisions were developed. See also *Resource management plan*.

Lease: A contract granting possession or control of real property for a determined period. The BLM employs numerous types of leases under different laws and statues, including, but not limited to, communication use leases, mineral leases, and grazing leases.

Major land resource areas (MLRAs): Geographically associated units of land sharing dominant physical characteristics, including physiography, geology, climate, water, soils, biological resources, and land uses.

Management of Land Boundary (MLB): A high level boundary evidence risk assessment for transactions, projects, and special designated areas, generally focused on high risk boundaries of high valued lands or resources; used in outyear budget and workforce planning documents.

Migratory birds: Bird species that migrate from breeding grounds in the temperate portions of the continent to winter in the tropics of North, Central, and South America. These also include species that breed in the arctic or boreal regions of North America and winter in temperate portions of the continental US.

Mineral: Any naturally formed, inorganic material; solid or fluid inorganic substance that can be extracted from the earth; and any of various naturally occurring homogeneous substances (such as stone, coal, salt, sulfur, sand, petroleum, water, or natural gas) obtained usually from the ground. Under federal laws, minerals are considered as locatable (subject to the general mining laws), leasable (subject to the Mineral Leasing Act of 1920), and salable (subject to the Materials Act of 1947).

Mining claim: A parcel of land that a miner takes and holds for mining purposes, having acquired the right of possession by complying with the Mining Law of 1872 and local laws and rules. A mining claim may contain as many adjoining locations as the locator may make or buy. There are four categories of mining claims: lode, placer, mill site, and tunnel site.

Mitigation: A method or process by which impacts from actions can be made less injurious to the environment through appropriate protective measures.

Mitigation measures: Methods or actions that will reduce adverse impacts from solar facility development. Mitigation measures can include BMPs, stipulations in BLM ROW agreements, siting criteria, and technology controls.

Multiple use: The management of the public lands and their various resource values so that they are used in the combination that will best meet the present and future needs of the American people. Multiple use means making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to changing needs and conditions; using some land for less than all of the resources; using the land in a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and nonrenewable resources, including recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific, and historical values; and considering harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

National Ambient Air Quality Standards (NAAQS): Air quality standards established by the CAA, as amended. The primary NAAQS are intended to protect the public health with an adequate margin of safety; the secondary NAAQS are intended to protect the public welfare from any known or anticipated adverse effects of a pollutant.

National Environmental Policy Act of 1969 (NEPA): Public Law 91-190. Establishes environmental policy for the nation. NEPA requires federal agencies to consider environmental values in decision-making processes.

National Historic Preservation Act (NHPA): A federal law providing that property resources with significant national historic value be placed on the NRHP. It does not require permits; rather, it mandates consultation with the proper agencies whenever it is determined that a proposed action might impact a historic property.

National Pollutant Discharge Elimination System: A federal permitting system controlling the discharge of effluents to surface water and regulated through the CWA, as amended.

National Register of Historic Places (NRHP): A comprehensive list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The NRHP is administered by the National Park Service, which is part of the Department of the Interior.

Native American tribe: Means a Tribal Nation that is defined as an American Indian or Alaska Native Tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges as a Federally recognized Tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994 (25 U.S.C. 5130) and per 512 Departmental Manual 4.

Naturalness (ecological): Consistent with what would occur without human intervention. For vegetation structure, naturalness implies a pattern similar to what fire and climate would produce across the landscape.

Naturalness (wilderness): The degree to which an area generally appears to have been affected primarily by the forces of nature with the imprint of people's work substantially unnoticeable.

Noxious weeds: Plants that are designated under federal and state noxious weed acts. Noxious weeds in Nevada are designated in the Nevada Revised Statutes Section 555.010 and are categorized by their distribution and exclusion or eradication objectives.

Occupied habitat: Suitable habitat that is seasonally or permanently occupied by a species of plant or wildlife.

Off-highway vehicle (OHV): Any motorized vehicle capable of, or designated for, travel on or immediately over land, water, or other natural terrain, excluding any non-amphibious registered motorboat; any military, fire, emergency, or law enforcement vehicle while being used for emergency purposes; any vehicle whose use is expressly authorized by the BLM Authorized Officer, or otherwise officially approved; vehicles in official use; and any combat or combat support vehicle when used for national defense emergencies (43 CFR 8340.0-5).

Paleontological resources: Fossilized remains, imprints, and traces of plants and animals preserved in rocks and sediments since some past geological time.

Particulate matter (PM): One of the six criteria pollutants for which the EPA established NAAQS. Particulate matter is defined as two categories, fine particulates, with an aerodynamic diameter of 10 micrometers (PM_{10}) or less, and fine particulates with an aerodynamic diameter of 2.5 micrometers or less ($PM_{2.5}$).

Perennial stream: A stream that flows continuously. Perennial streams are generally associated with a water table in the localities through which they flow.

Photovoltaic (PV): Technology that uses semiconducting materials that convert sunlight directly into electricity.

Playa: Flat area that contains a seasonal or year-to-year shallow lake that often evaporates, leaving minerals behind.

Potential Fossil Yield Classification (PFYC): A system used by the BLM to classify geological units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential.

Prehistoric: The time period before the appearance of written records. This generally refers to Indigenous, precontact societies.

Primitive and unconfined recreation: Nonmotorized, nonmechanized (except as provided by law), and undeveloped types of recreational activities.

Public Land Survey System (PLSS): The method of subdividing and describing land, mainly in the western United States. The PLSS is commonly referred to as the Rectangular Survey System. The PLSS components are state, principal meridian, township, range, and section, and then further subdivided into aliquot parts, or lots.

Public Land Survey System Dataset (PLSSDS): The BLM geographic dataset that is part of the Cadastral National Spatial Data Infrastructure data set and is the BLM's official dataset for rectangular and non-rectangular PLSS data; this dataset represents the authoritative GIS version of the PLSS and mineral surveys; it is not for boundary determinations.

Rangeland: Land on which the native vegetation, climax, or natural potential consists predominately of grasses, grass-like plants, forbs, or shrubs. Rangeland includes lands that are revegetated naturally or artificially to provide a plant cover that is managed like native vegetation. Rangelands may consist of natural grasslands, savannas, shrublands, most deserts, tundra, alpine communities, coastal marshes, and wet meadows.

Reclamation: Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land management plan.

Record of decision (ROD): A document separate from but associated with an EIS that publicly and officially discloses the responsible agency's decision on the EIS alternative to be implemented.

Renewable energy: Energy resources that constantly renew themselves or that are regarded as practically inexhaustible. These include solar, wind, geothermal, hydro, and biomass.

Resource management plan (RMP): A land use plan as prescribed by the Federal Land Policy and Management Act that establishes, for a given area of land, land use allocations, coordination guidelines for multiple-use objectives, and actions to be achieved.

Right-of-way (ROW): A grant, easement, lease, permit, or license to occupy, develop, use, or traverse public lands. The Secretary of the Interior is authorized to grant, issue, or renew rights-of-way over, upon, under, or through public lands for such purposes including, but not limited to, reservoirs, canals, ditches, pipelines, roads, trails, highways, transmission lines, communication lines, systems for the transmission and reception of communication signals, railroads, tunnels, and airways.

Roadless: The absence of roads that have been constructed and maintained by mechanical means to ensure regular and continuous use.

Scoping: The process of inviting public comment on what should be considered prior to preparation of an EIS. Scoping assists the preparers of an EIS in defining the proposed action, identifying alternatives, and developing preliminary issues to be addressed in an EIS.

Segregation: According to the regulations found at 43 CFR 2091.3–1(e) and 43 CFR 2804.25(f), the BLM's ability to temporarily segregate public lands within a ROW application area for solar energy development from the operation of the public land laws, including the Mining Law, by publication of a *Federal Register* notice. The BLM uses this temporary segregation authority to preserve its ability to approve, approve with modifications, or deny proposed ROWs, and to facilitate the orderly administration of the public lands. Such temporary segregations may be subject to valid existing rights, including existing mining claims located before the segregation notice.

Sensitive species: A plant or animal species listed by the state or federal government as threatened, endangered, or as a species of special concern. The list of BLM sensitive species varies from state to state. Also, a species that is adversely affected by disturbance or altered environmental conditions.

Solitude: The state of being alone or remote from habitations; isolation. A lonely or secluded place. Factors contributing to opportunities for solitude may include size, natural screening, topographic relief, vistas, physiographic variety, and the ability of the user to find a secluded spot.

Special recreation permit (SRP): Authorization that allows for recreational uses of public lands and related waters issued to manage visitor use, protect recreational and natural resources, and provide for the health and safety of visitors.

Special status species (threatened, endangered, sensitive, or rare): Includes both plant and animal species that are proposed for listing, officially listed as threatened or endangered, or are candidates for listing as threatened or endangered under the provisions of the Endangered Species Act; those listed by a state in a category such as threatened or endangered, implying potential endangerment or extinction; and those designated by a BLM state director as sensitive.

Standards for boundary evidence (SBE): Boundary evidence risk assessment; standards for boundary evidence certificates are (1) land survey services request, (2) land surveyor report, and (3) boundary evidence certificate of inspection and possession. Execution of the standards for boundary evidence process is intended to identify defects in the boundary evidence and give guidance to managers to manage risks associated with significant transactions or projects.

State Historic Preservation Officer (SHPO): The State officer charged with the identification and protection of prehistoric and historic resources in accordance with the NHPA.

Suitable habitat: Habitat providing the physical, biological, or ecological characteristics necessary to support a species of plant or wildlife.

Surface management agency (SMA): Depicts surface estate federal land for the United States and classifies this land by its active federal surface management agency.

Threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Requirements for declaring a species threatened are contained in the Endangered Species Act.

Topography: The shape of the earth's surface; the relative position and elevations of natural and human-made features of an area.

Traditional cultural property (TCP): A property that derives significance from traditional values associated with it by a social or cultural group, such as an Indian tribe or local community. A TCP may qualify for the NRHP if it meets the criteria or criteria exceptions at 36 CFR 60.4 (see *National Register Bulletin* 38).

Transmission corridor: For an electric or pipeline transmission corridor, a route approved on public lands in a BLM or other federal agency land use plan as a location that may be suitable for the siting of electric or pipeline transmission systems.

Transmission line: A set of electrical current conductors, insulators, supporting structures, and associated equipment used to move large quantities of power at high voltage, usually over long distances (for example, between a power plant and the communities that it serves).

Valid existing rights: Documented, legal rights or interests in the land that allow a person or entity to use said land for a specific purpose and that are still in effect. Such rights include, but are not limited to, fee title ownership, mineral rights, ROWs, easements, permits, and licenses. Such rights may have been reserved, acquired, leased, granted, permitted, or otherwise authorized over time.

Vertebrate: An animal that possesses a vertebral column (a backbone or spine).

Visual resource inventory: Consists of a scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. Based on these three factors, BLM-administered lands are placed into one of four visual resource inventory classes.

Visual resource inventory classes: Visual resource inventory classes assigned to public lands based on the results from the visual resource inventory. They do not establish management direction and should not be used as a basis for constraining or limiting surface-disturbing activities. Inventory classes are informational in nature and provide the basis for considering visual values in the RMP process. There are four classes (I, II, III, and IV).

Visual resource management (VRM) classes: Categories assigned to BLM-administered lands, utilizing the visual resource inventory classes in the RMP process, with an objective that prescribes the amount of change allowed in the characteristic landscape. All actions proposed during the RMP process that would result in surface disturbances must consider the importance of the visual values and the impacts the project may have on these values. Management decisions in the RMP must reflect the value of visual resources. The value of the visual resource may be the driving force for some management decisions. There are four VRM classes (I, II, III and IV).

Visual resource management (VRM) class designations: Designation of VRM classes that each have an objective. The Class I objective is to preserve the landscape's existing character. The level of change to the characteristic landscape should be very low and must not attract attention. The Class II objective is to retain the landscape's existing character. The level of change to the characteristic landscape should be low. Management activities may be seen, but they must not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural landscape features. The Class III objective is to partially retain the landscape's existing character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but they should not dominate the view of the casual observer. Changes should repeat the basic elements of form, line, color, and texture found in the predominant natural landscape features. The Class IV objective is to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

Volatile organic compounds: Chemicals that produce vapors readily at room temperature and at normal atmospheric pressure. Volatile organic compounds include gasoline; industrial chemicals, such as benzene; solvents, such as toluene and xylene; and tetrachloroethylene (perchloroethylene, which is the principal dry cleaning solvent).

Wash: A normally dry streambed that occasionally fills with water.

Watershed: Topographical region or area delineated by water draining to a particular watercourse or body of water.

Wilderness characteristics: Wilderness attributes that include the area's size, its apparent naturalness, and the outstanding opportunities for solitude or a primitive and unconfined type of recreation. They may also include supplemental values. Lands with wilderness characteristics are those lands that have been inventoried and determined by the BLM to contain wilderness characteristics, as defined in Section 2(c) of the Wilderness Act.

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Appendix A
Figures

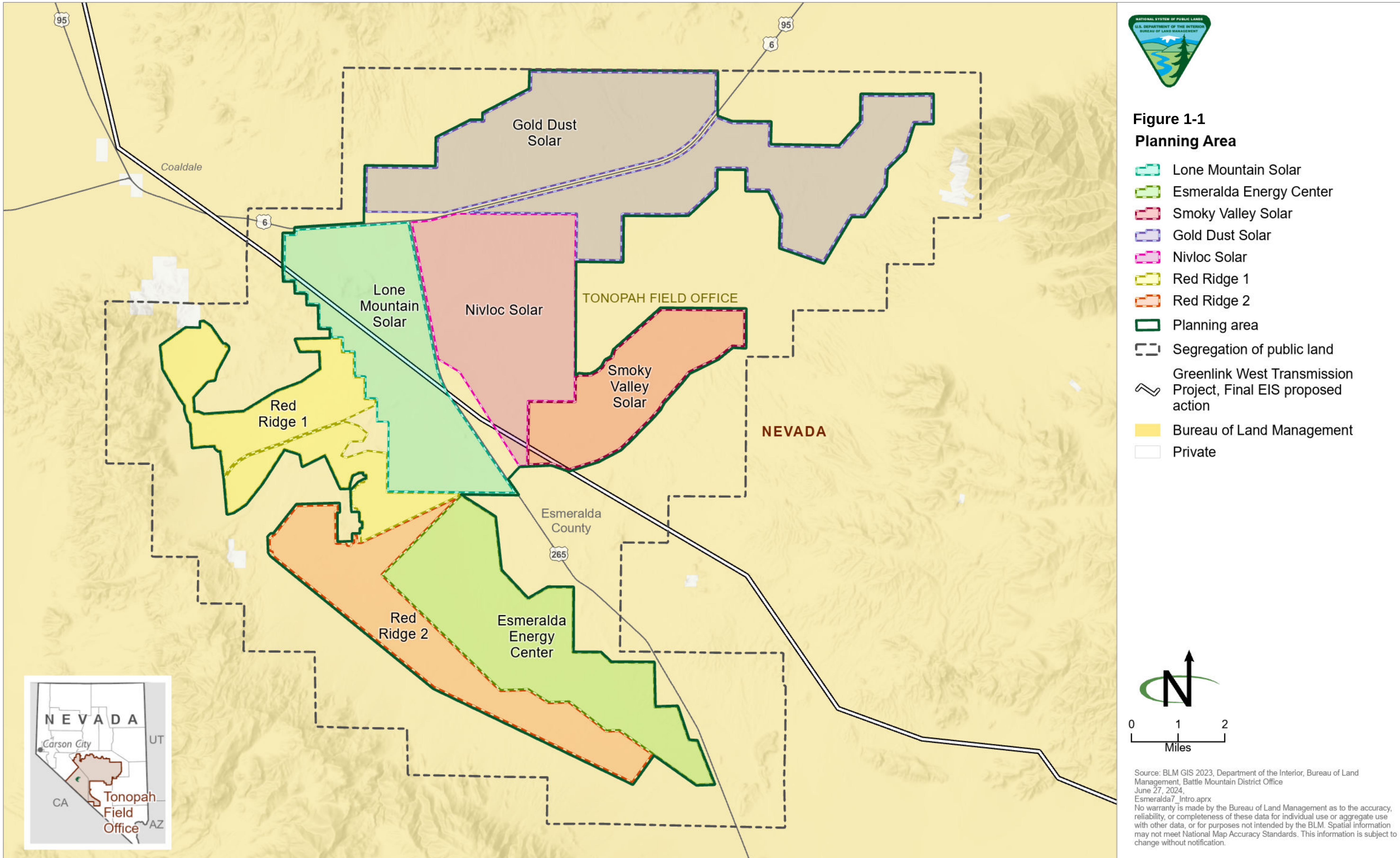
Figure 1-1
Planning Area
Lone Mountain Solar
Esmeralda Energy Center
Smoky Valley Solar
Gold Dust Solar
Nivloc Solar
Red Ridge 1
Red Ridge 2
Planning area
Segregation of public land
Greenlink West Transmission Project, Final EIS proposed action
Bureau of Land Management
Private
Gold Dust Solar
Lone Mountain Solar
Nivloc Solar
TONOPAH FIELD OFFICE
Smoky Valley Solar
Red Ridge 1
Red Ridge 2
Esmeralda Energy Center
Esmeralda County
NEVADA
Coaldale
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NEVADA
Carson City
UT
CA
AZ
Tonopah Field Office
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Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
June 27, 2024,
Esmeralda7_Intro.aprx
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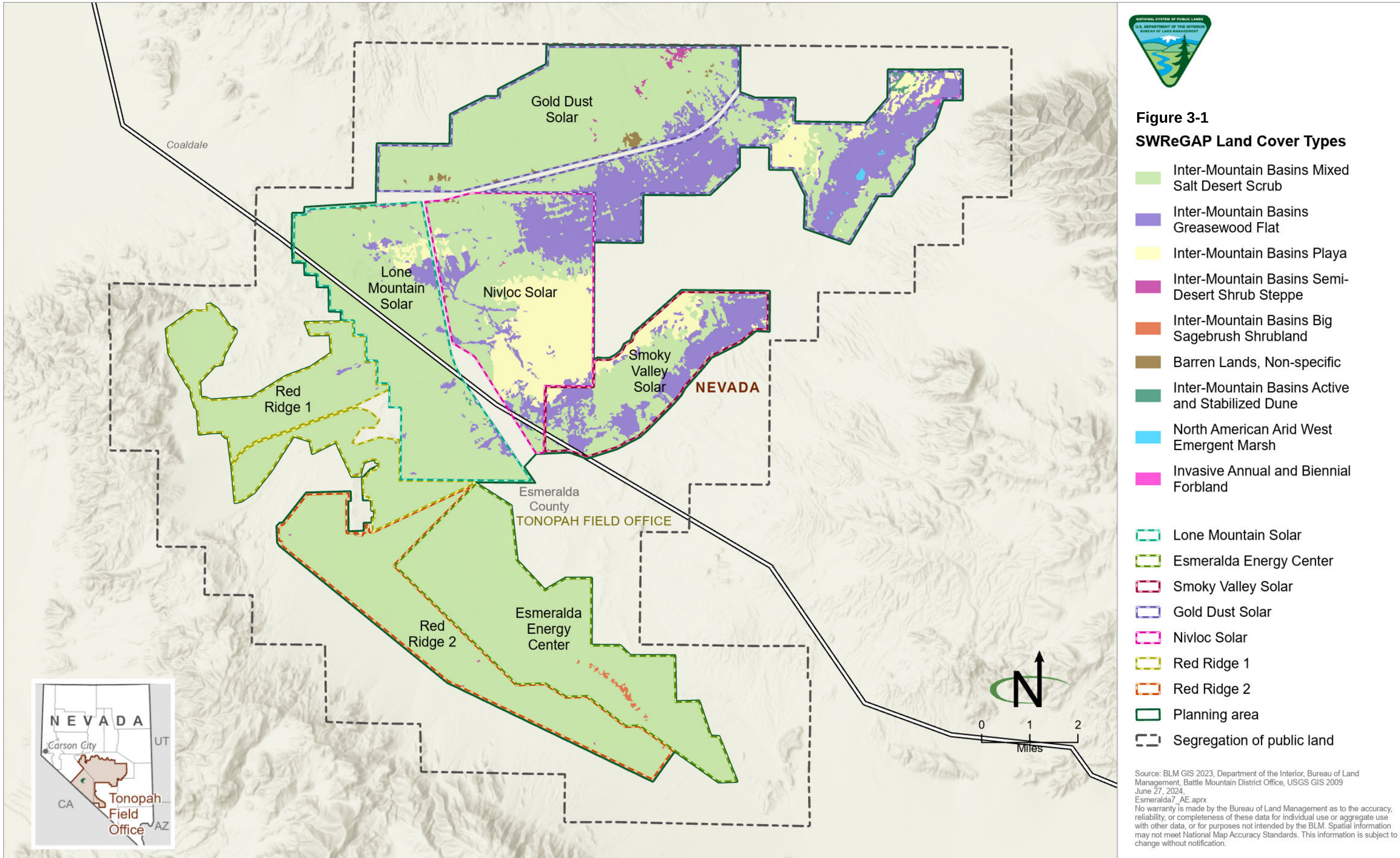
Figure 3-1
SWReGAP Land Cover Types
Inter-Mountain Basins Mixed Salt Desert Scrub
Inter-Mountain Basins Greasewood Flat
Inter-Mountain Basins Playa
Inter-Mountain Basins Semi-Desert Shrub Steppe
Inter-Mountain Basins Big Sagebrush Shrubland
Barren Lands, Non-specific
Inter-Mountain Basins Active and Stabilized Dune
North American Arid West Emergent Marsh
Invasive Annual and Biennial Forbland
Lone Mountain Solar
Esmeralda Energy Center
Smoky Valley Solar
Gold Dust Solar
Nivloc Solar
Red Ridge 1
Red Ridge 2
Planning area
Segregation of public land
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2009
June 27, 2024,
Esmeralda7_AE.aprx
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Coaldale
Gold Dust Solar
Lone Mountain Solar
Nivloc Solar
Smoky Valley Solar
NEVADA
Red Ridge 1
Esmeralda County
TONOPAH FIELD OFFICE
Red Ridge 2
Esmeralda Energy Center
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Tonopah Field Office

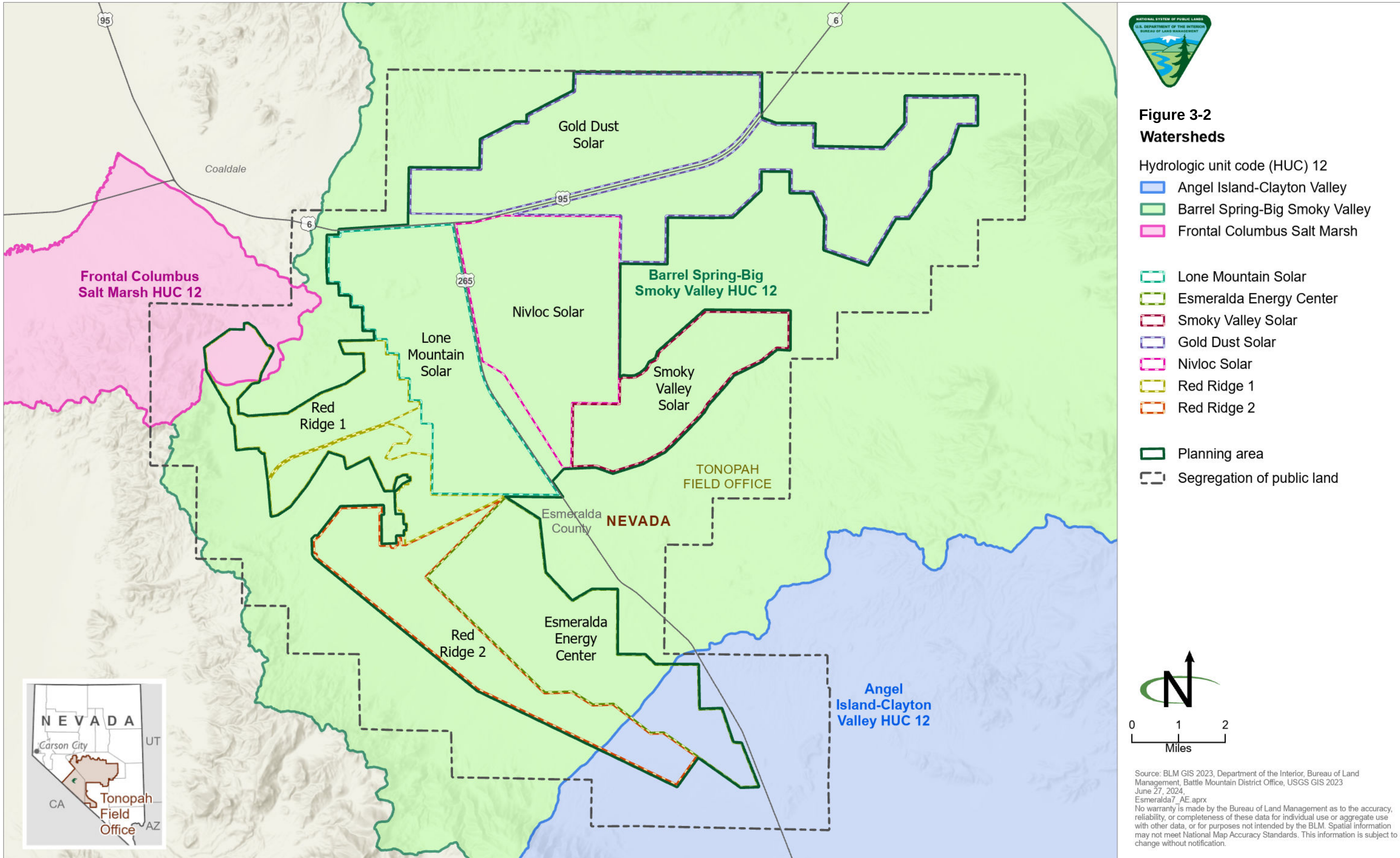
Figure 3-2
Watersheds
Hydrologic unit code (HUC) 12
Angel Island-Clayton Valley
Barrel Spring-Big Smoky Valley
Frontal Columbus Salt Marsh
Lone Mountain Solar
Esmeralda Energy Center
Smoky Valley Solar
Gold Dust Solar
Nivloc Solar
Red Ridge 1
Red Ridge 2
Planning area
Segregation of public land
0 1 2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2023
June 27, 2024,
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95
6
Coaldale
Frontal Columbus Salt Marsh HUC 12
Gold Dust Solar
Barrel Spring-Big Smoky Valley HUC 12
265
Nivloc Solar
Lone Mountain Solar
Red Ridge 1
Smoky Valley Solar
TONOPAH FIELD OFFICE
Esmeralda County
NEVADA
Esmeralda Energy Center
Red Ridge 2
Angel Island-Clayton Valley HUC 12
N E V A D A
Carson City
UT
CA
AZ
Tonopah Field Office

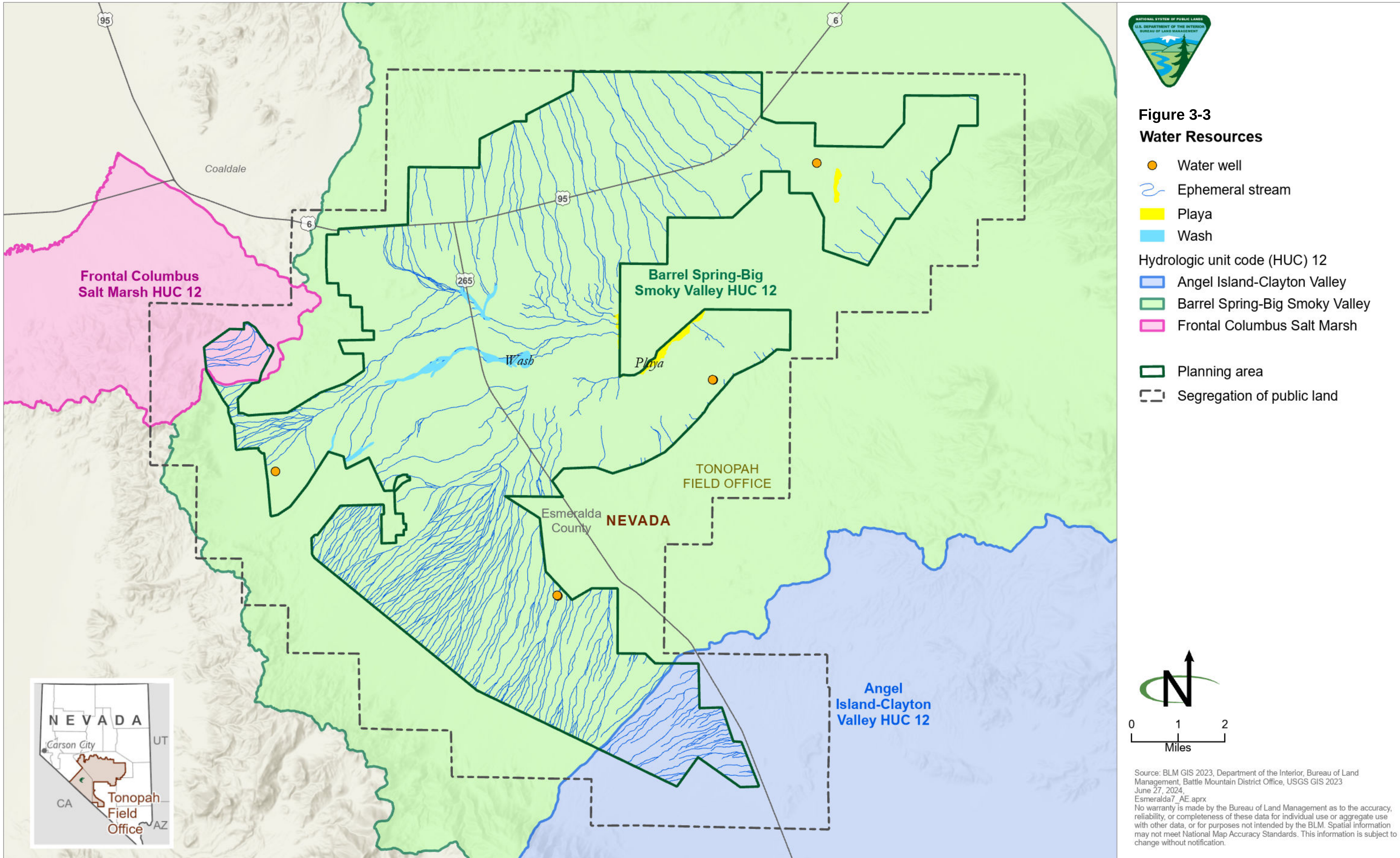

Figure 3-3
Water Resources

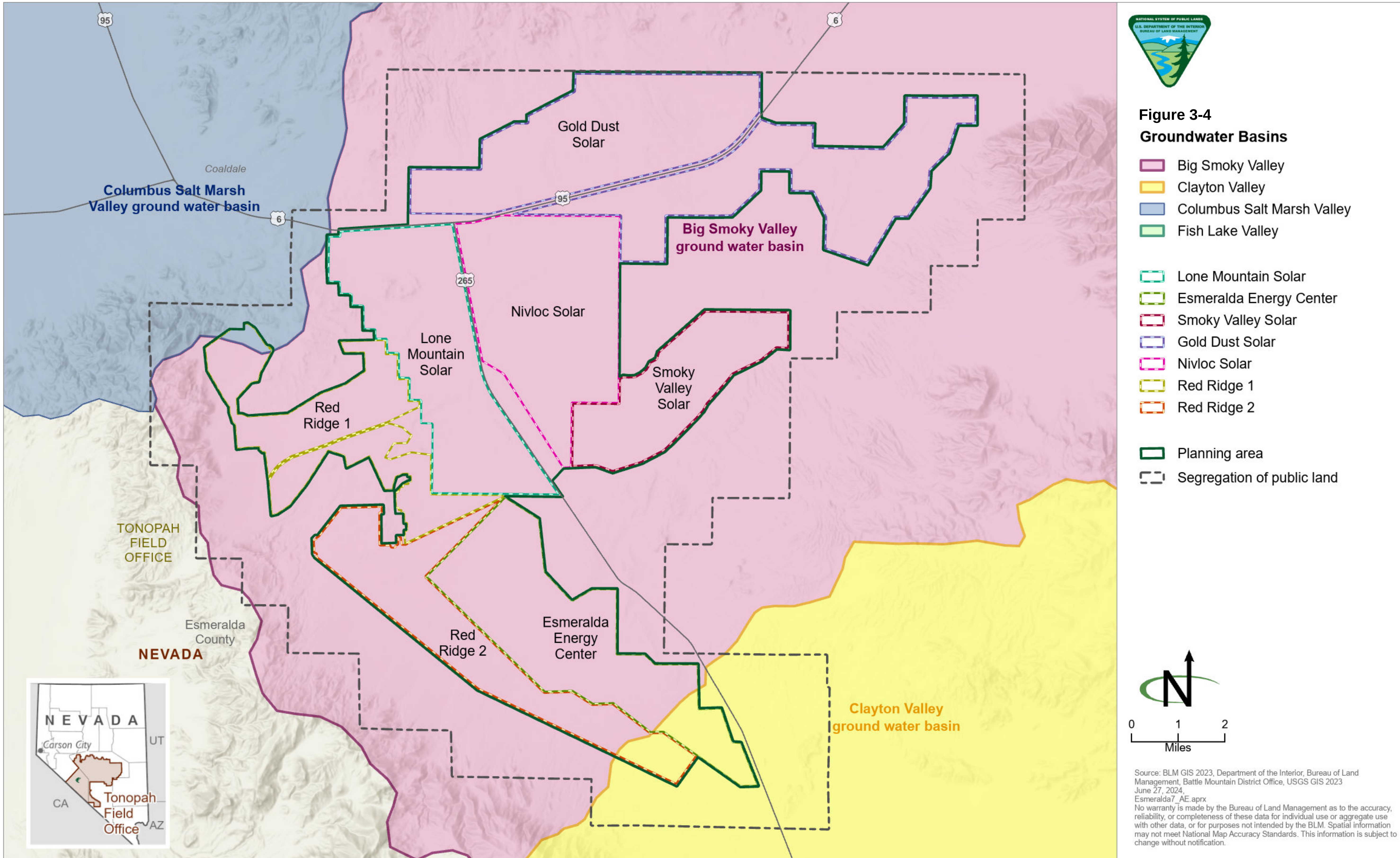

Figure 3-4
Groundwater Basins
Big Smoky Valley
Clayton Valley
Columbus Salt Marsh Valley
Fish Lake Valley
Lone Mountain Solar
Esmeralda Energy Center
Smoky Valley Solar
Gold Dust Solar
Nivloc Solar
Red Ridge 1
Red Ridge 2
Planning area
Segregation of public land
Columbus Salt Marsh Valley ground water basin
Coaldale
Big Smoky Valley ground water basin
Clayton Valley ground water basin
Gold Dust Solar
Nivloc Solar
Lone Mountain Solar
Red Ridge 1
Red Ridge 2
Smoky Valley Solar
Esmeralda Energy Center
TONOPAH FIELD OFFICE
Esmeralda County
NEVADA
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Carson City
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Tonopah Field Office
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Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2023
June 27, 2024,
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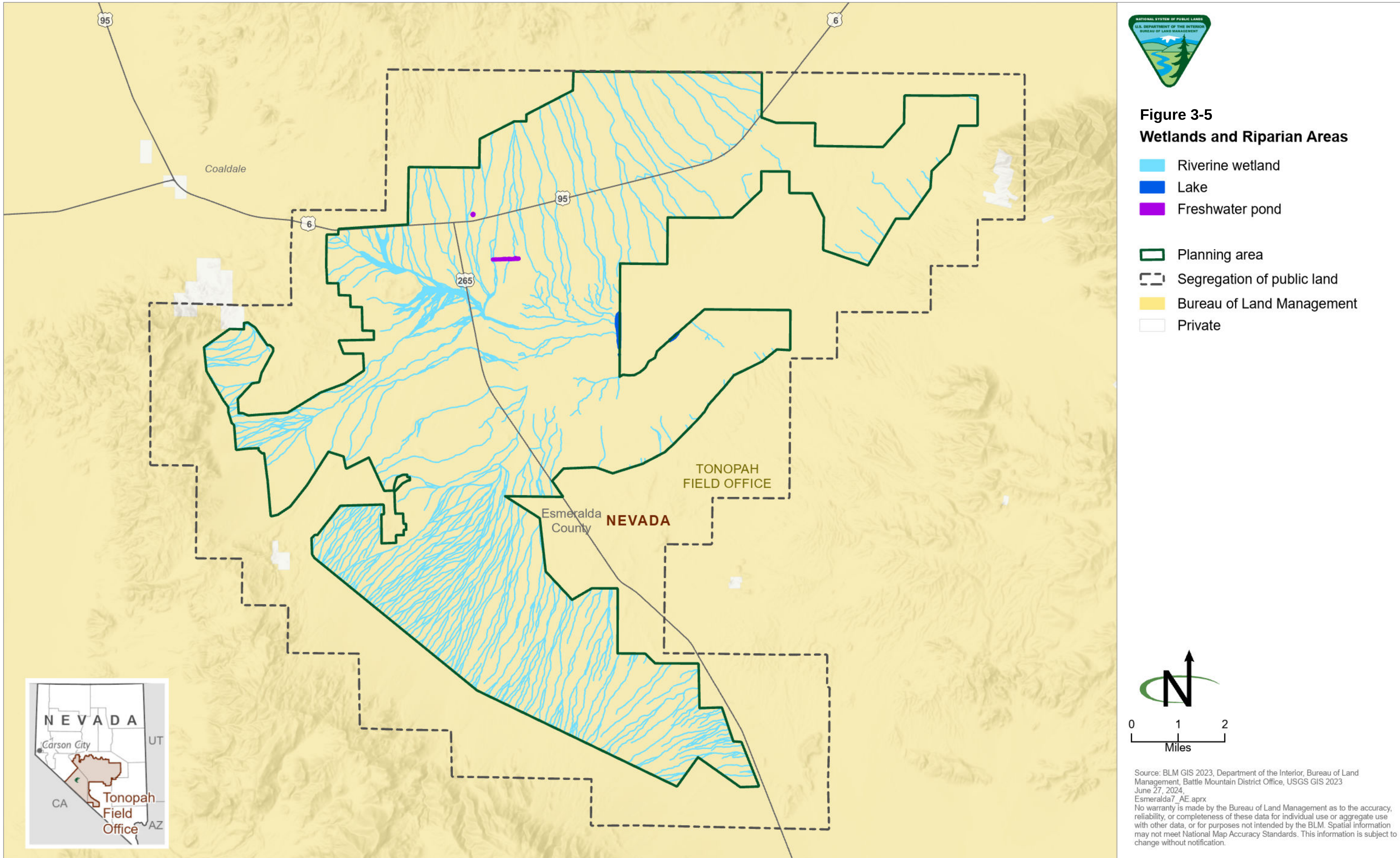
Figure 3-5
Wetlands and Riparian Areas
Riverine wetland
Lake
Freshwater pond
Planning area
Segregation of public land
Bureau of Land Management
Private
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2023
June 27, 2024,
Esmeralda7_AE.aprx
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95
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Coaldale
TONOPAH
FIELD OFFICE
Esmeralda
County
NEVADA
N E V A D A
Carson City
UT
CA
AZ
Tonopah
Field
Office

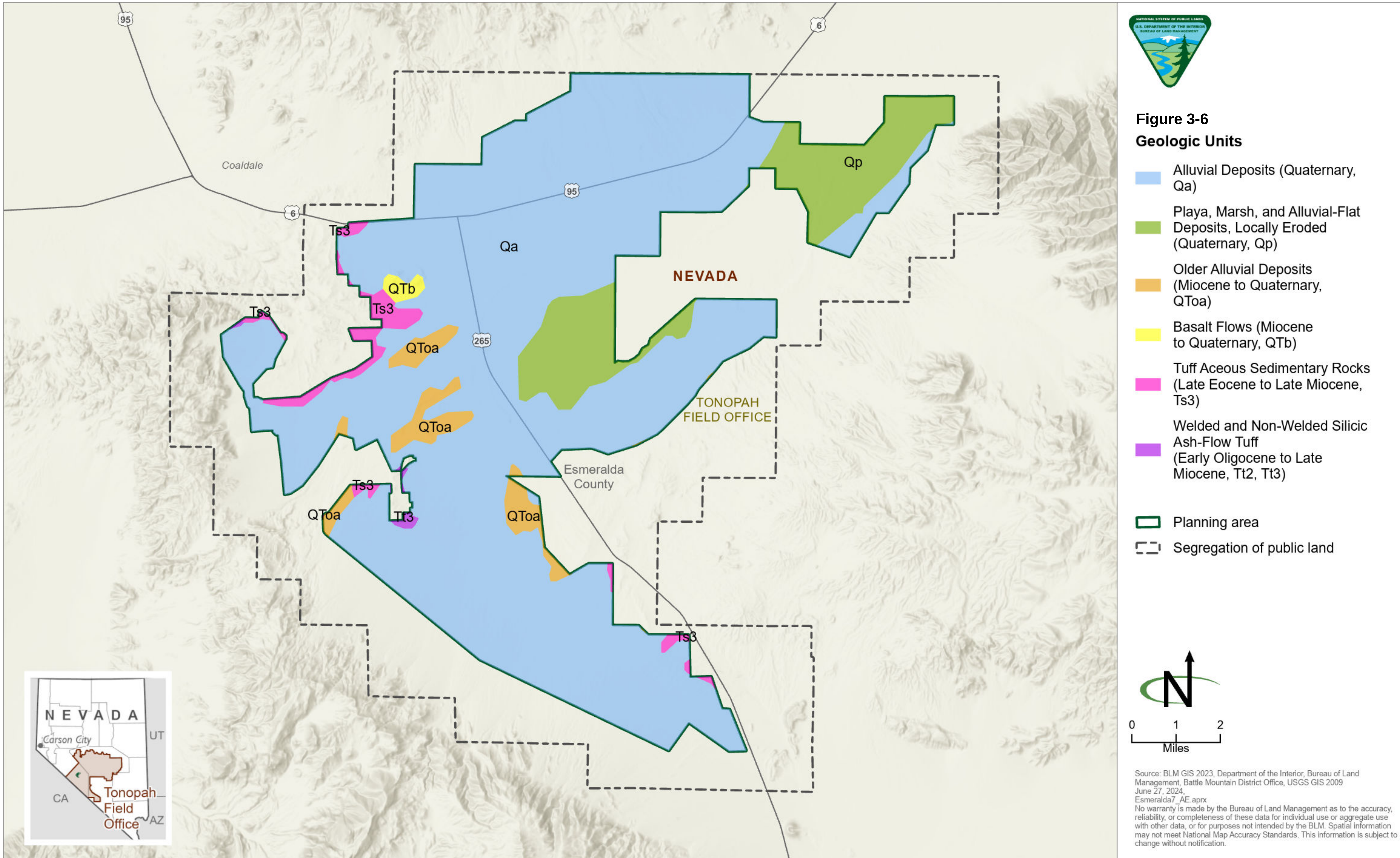
Figure 3-6
Geologic Units
Alluvial Deposits (Quaternary, Qa)
Playa, Marsh, and Alluvial-Flat Deposits, Locally Eroded (Quaternary, Qp)
Older Alluvial Deposits (Miocene to Quaternary, QToa)
Basalt Flows (Miocene to Quaternary, QTb)
Tuff Aceous Sedimentary Rocks (Late Eocene to Late Miocene, Ts3)
Welded and Non-Welded Silicic Ash-Flow Tuff (Early Oligocene to Late Miocene, Tt2, Tt3)
Planning area
Segregation of public land
0
1
2
Miles
N
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2009
June 27, 2024,
Esmeralda7_AE.aprx
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95
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Coaldale
Qa
Qp
NEVADA
Ts3
QTb
QToa
265
TONOPAH
FIELD OFFICE
Esmeralda
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N E V A D A
Carson City
UT
CA
Tonopah
Field
Office
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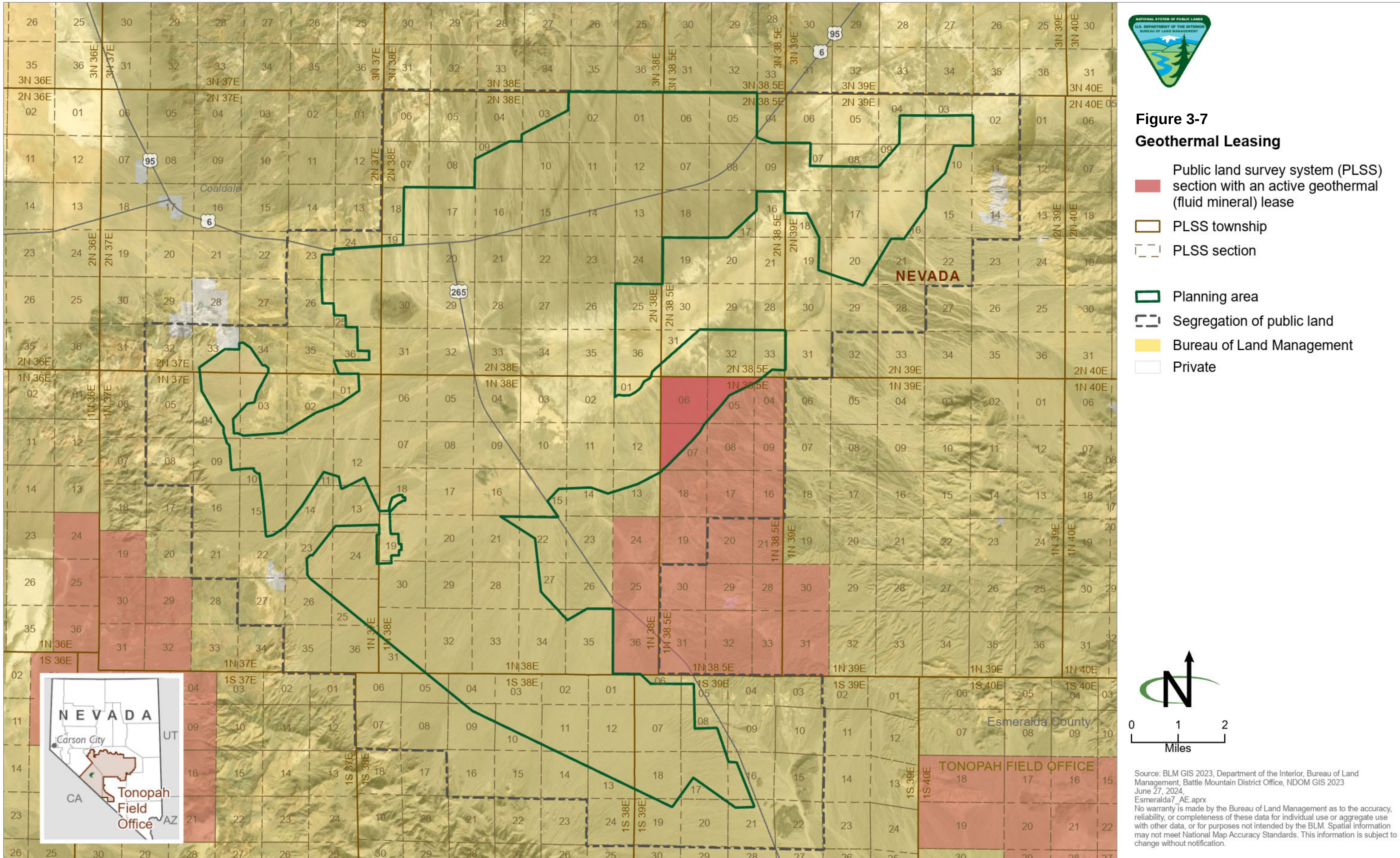
Figure 3-7
Geothermal Leasing
Public land survey system (PLSS) section with an active geothermal (fluid mineral) lease
PLSS township
PLSS section
Planning area
Segregation of public land
Bureau of Land Management
Private
NEVADA
TONOPAH FIELD OFFICE
Esmeralda County
Coaldale
N E V A D A
Carson City
UT
CA
AZ
Tonopah Field Office
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Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, NDOM GIS 2023
June 27, 2024,
Esmeralda7_AE.aprx
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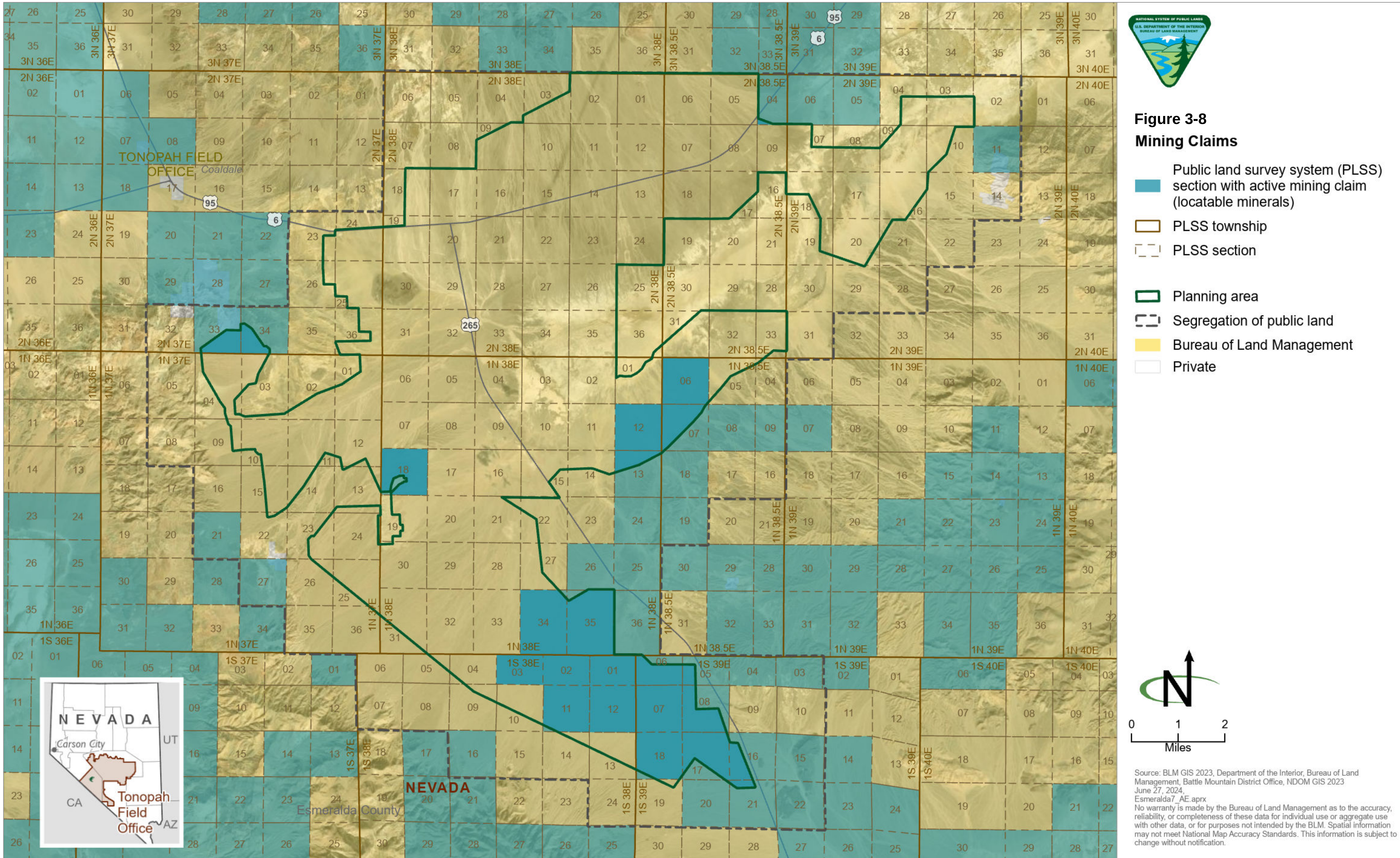

Figure 3-8
Mining Claims

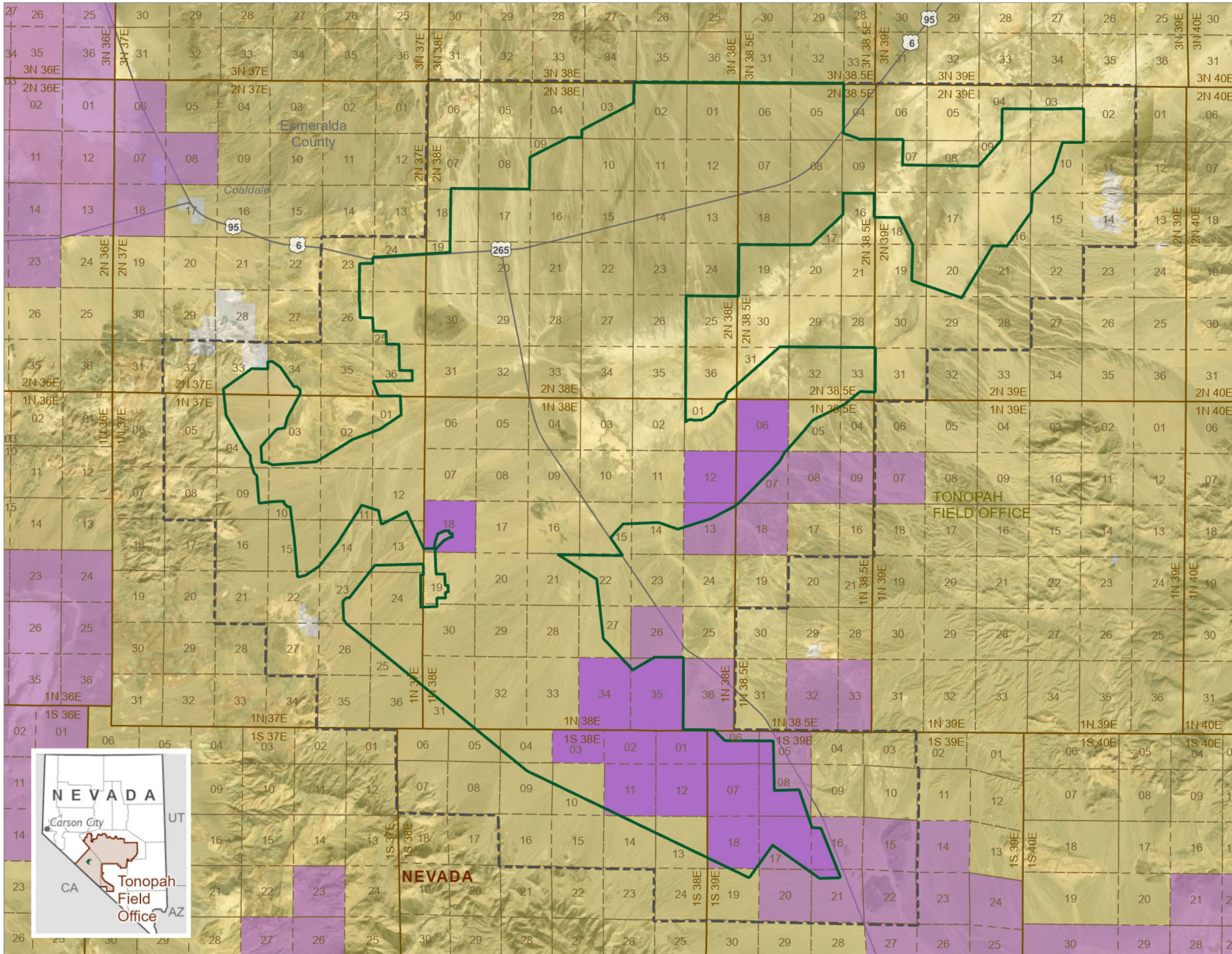

Figure 3-9
Inferred Lithium Placer Claims

- Public land survey system (PLSS) section with an inferred active lithium placer claim (locatable minerals)
- PLSS township
- PLSS section
- Planning area
- Segregation of public land
- Bureau of Land Management
- Private

0 1 2
Miles

Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, NDOM GIS 2023
June 27, 2024,
Esmeralda7_AE.aprx
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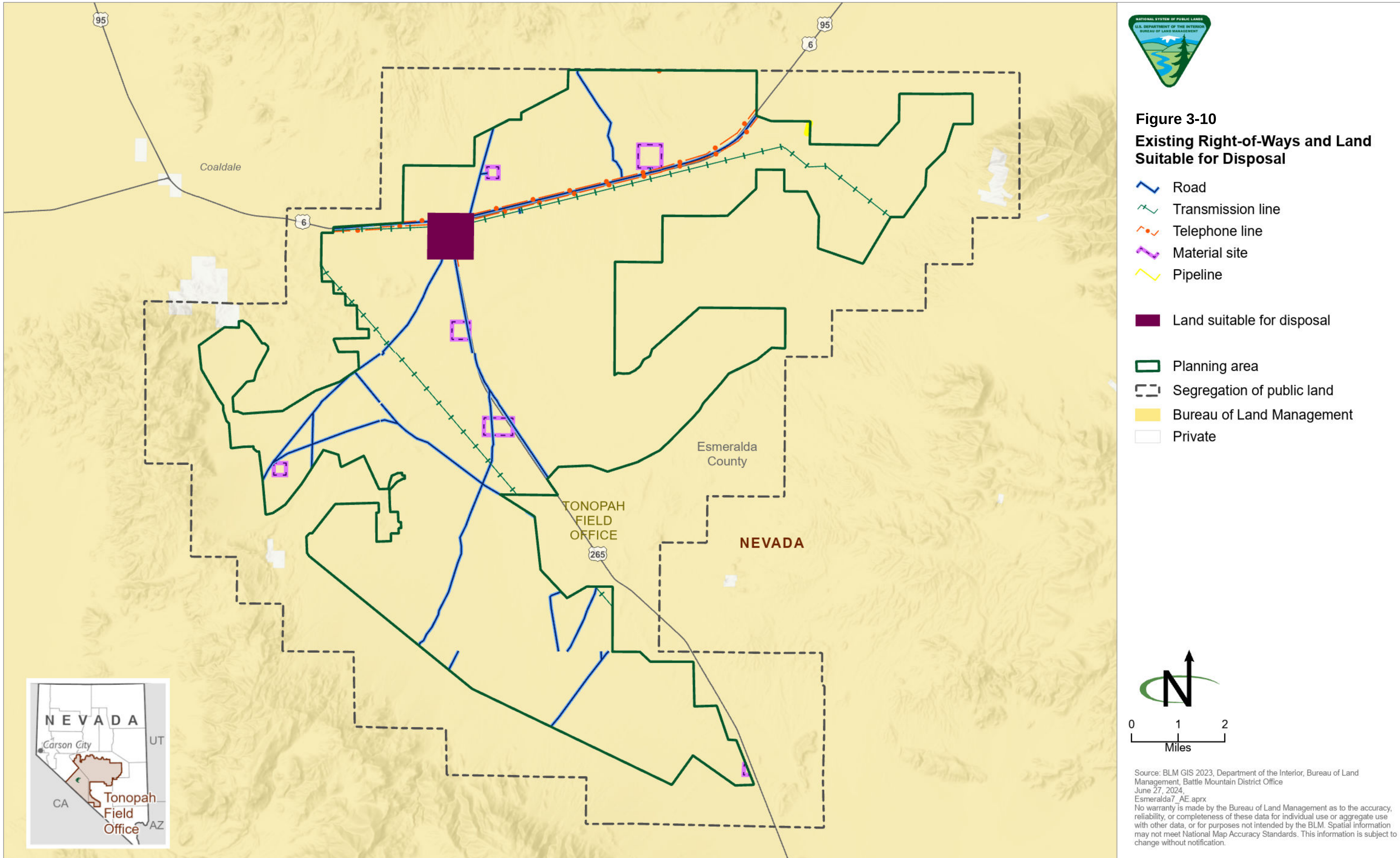
Figure 3-10
Existing Right-of-Ways and Land Suitable for Disposal
Road
Transmission line
Telephone line
Material site
Pipeline
Land suitable for disposal
Planning area
Segregation of public land
Bureau of Land Management
Private
Coaldale
Esmeralda County
TONOPAH FIELD OFFICE
NEVADA
95
6
265
N E V A D A
Carson City
UT
CA
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Tonopah Field Office
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Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
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Esmeralda7_AE.aprx
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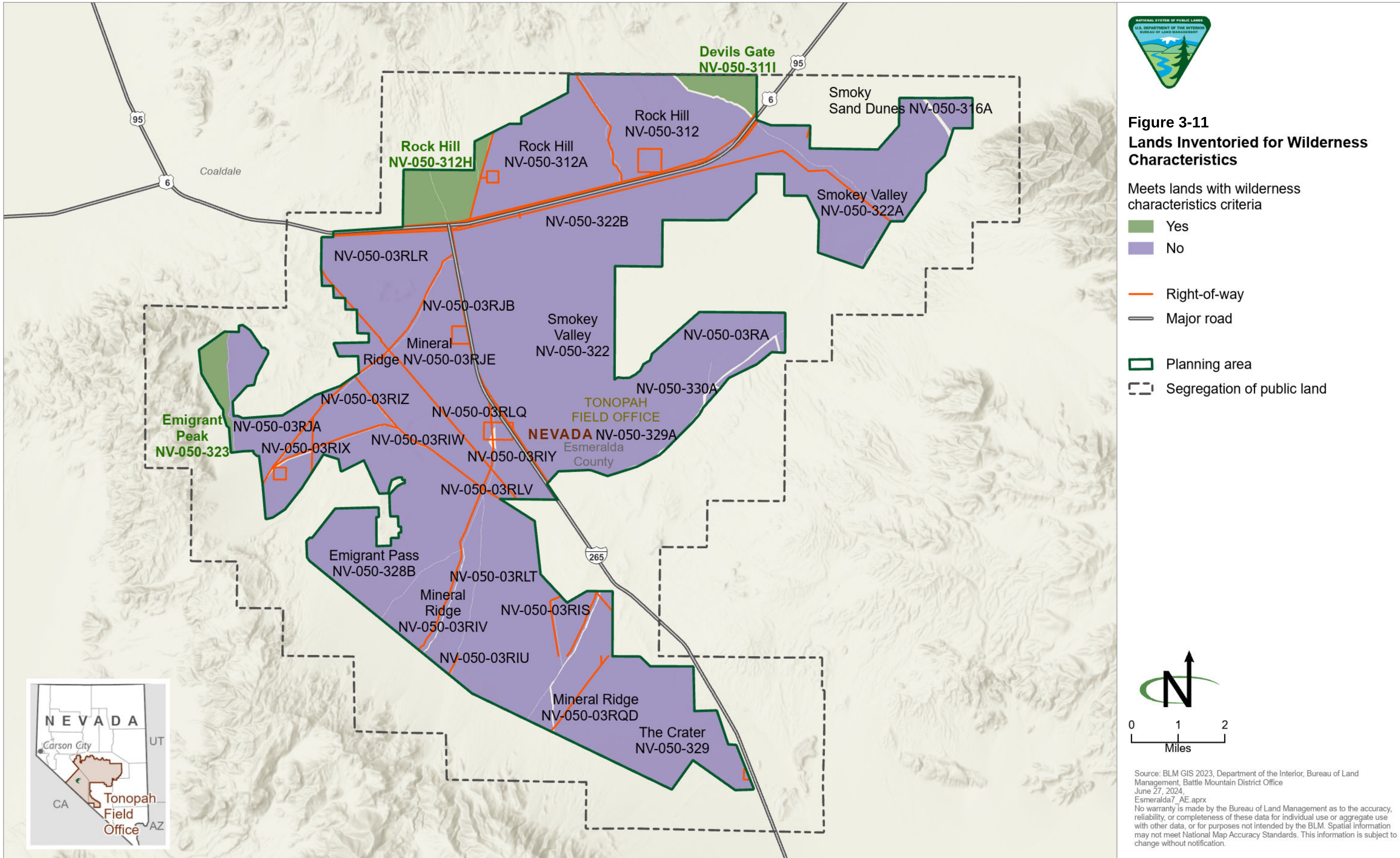
Figure 3-11
Lands Inventoried for Wilderness Characteristics
Meets lands with wilderness characteristics criteria
Yes
No
Right-of-way
Major road
Planning area
Segregation of public land
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
June 27, 2024,
Esmeralda7_AE.aprx
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Devils Gate
NV-050-311I
Smoky
Sand Dunes NV-050-316A
Rock Hill
NV-050-312
Rock Hill
NV-050-312H
Rock Hill
NV-050-312A
Coaldale
Smokey Valley
NV-050-322A
NV-050-322B
NV-050-03RLR
NV-050-03RJB
Smokey
Valley
NV-050-322
NV-050-03RA
Mineral
Ridge NV-050-03RJE
NV-050-330A
NV-050-03RIZ
TONOPAH
FIELD OFFICE
Emigrant
Peak
NV-050-323
NV-050-03RJA
NV-050-03RLQ
NV-050-03RIW
NEVADA
NV-050-329A
Esmeralda
County
NV-050-03RIX
NV-050-03RIY
NV-050-03RLV
Emigrant Pass
NV-050-328B
NV-050-03RLT
Mineral
Ridge
NV-050-03RIV
NV-050-03RIS
NV-050-03RIU
Mineral Ridge
NV-050-03RQD
The Crater
NV-050-329
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NEVADA
Carson City
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Tonopah
Field
Office

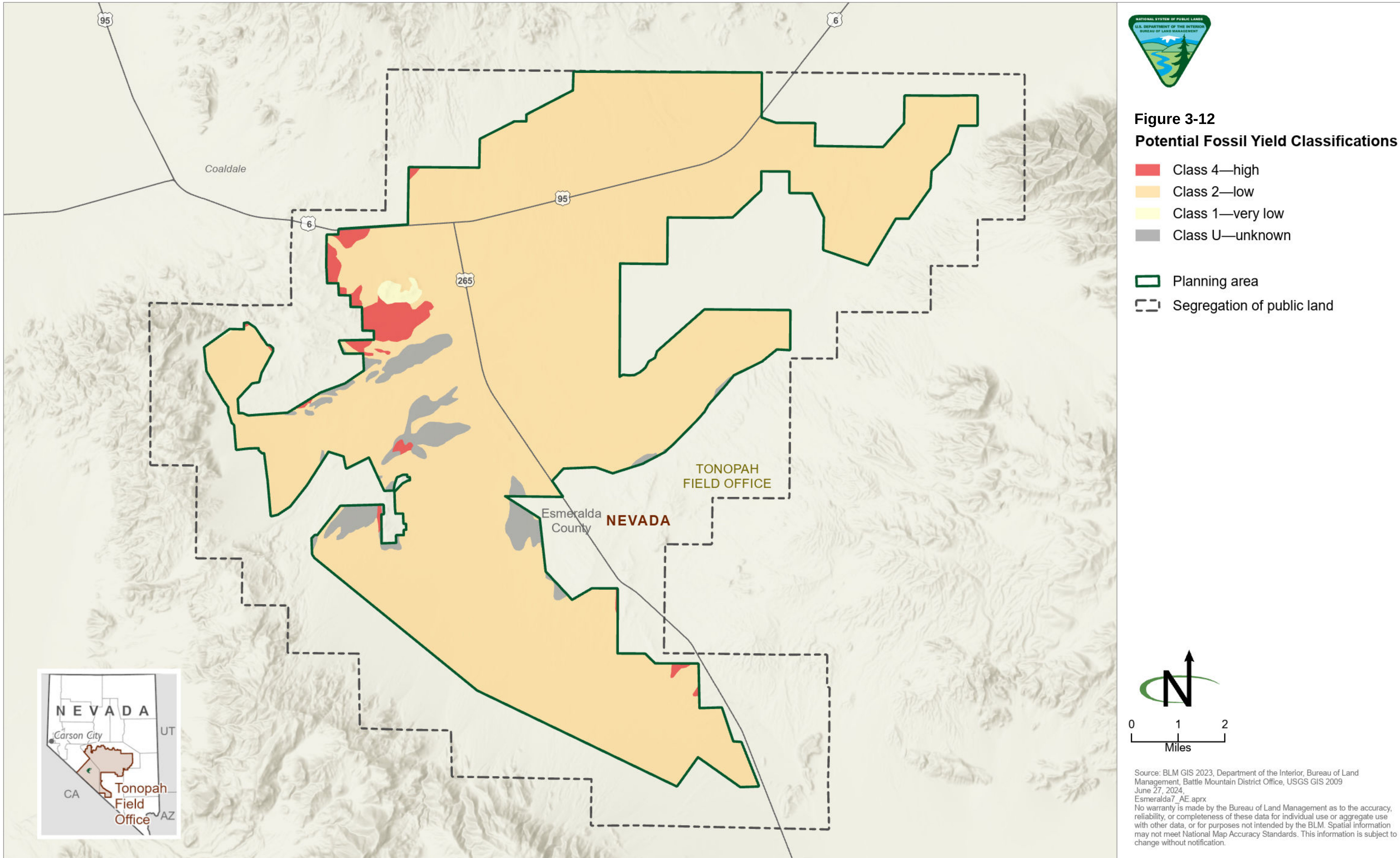
Figure 3-12
Potential Fossil Yield Classifications
Class 4—high
Class 2—low
Class 1—very low
Class U—unknown
Planning area
Segregation of public land
95
6
95
6
265
Coaldale
TONOPAH
FIELD OFFICE
Esmeralda
County
NEVADA
N E V A D A
Carson City
UT
CA
AZ
Tonopah
Field
Office
N
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2009
June 27, 2024,
Esmeralda7_AE.aprx
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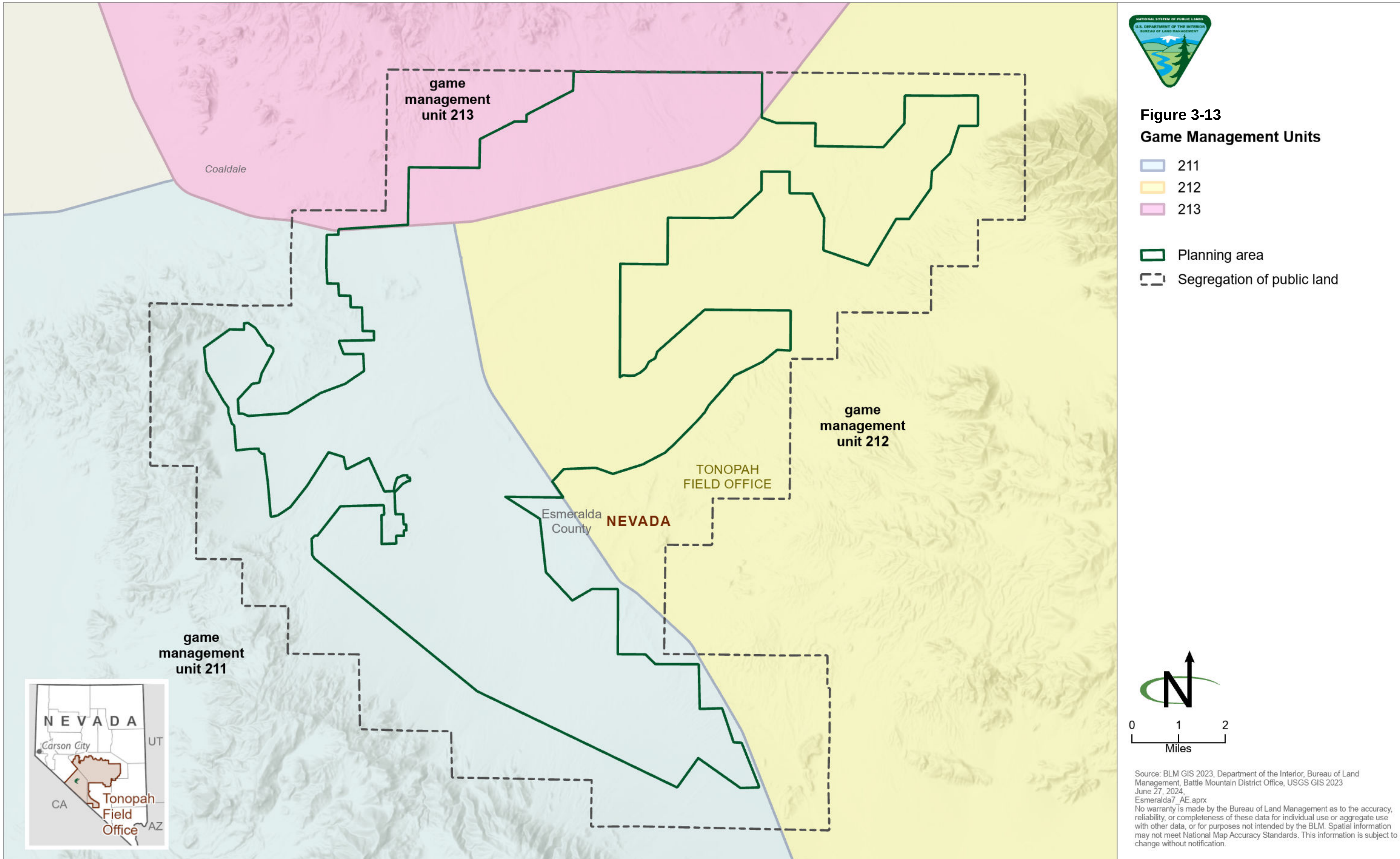
game management unit 213
Coaldale
game management unit 212
TONOPAH FIELD OFFICE
Esmeralda County
NEVADA
game management unit 211
NEVADA
Carson City
UT
CA
AZ
Tonopah Field Office
Figure 3-13
Game Management Units
211
212
213
Planning area
Segregation of public land
N
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2023
June 27, 2024,
Esmeralda7_AE.aprx
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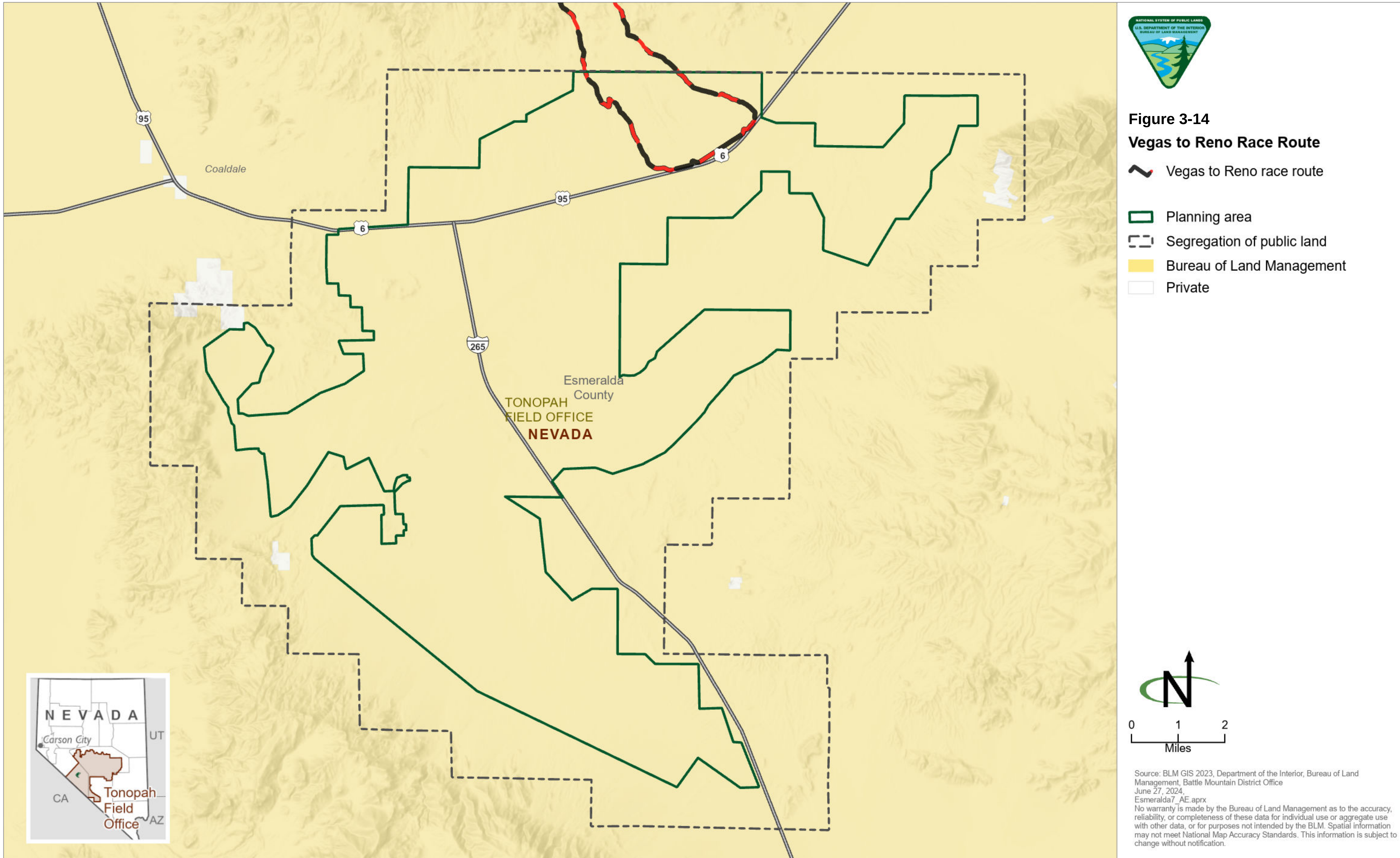
Figure 3-14
Vegas to Reno Race Route
Vegas to Reno race route
Planning area
Segregation of public land
Bureau of Land Management
Private
95
Coaldale
6
95
265
Esmeralda County
TONOPAH FIELD OFFICE
NEVADA
N E V A D A
Carson City
UT
CA
Tonopah Field Office
AZ
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
June 27, 2024,
Esmeralda7_AE.aprx
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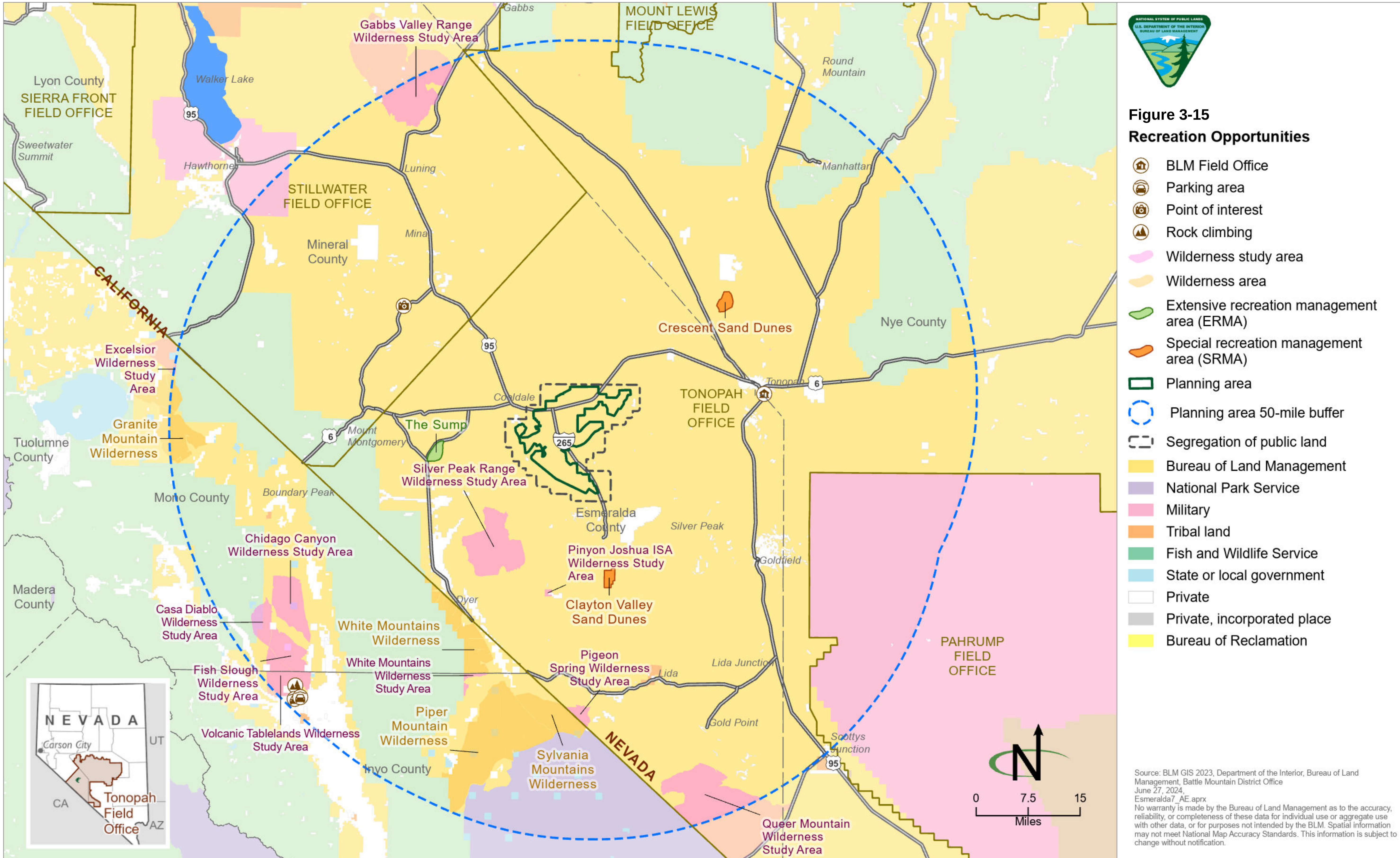

Figure 3-15
Recreation Opportunities

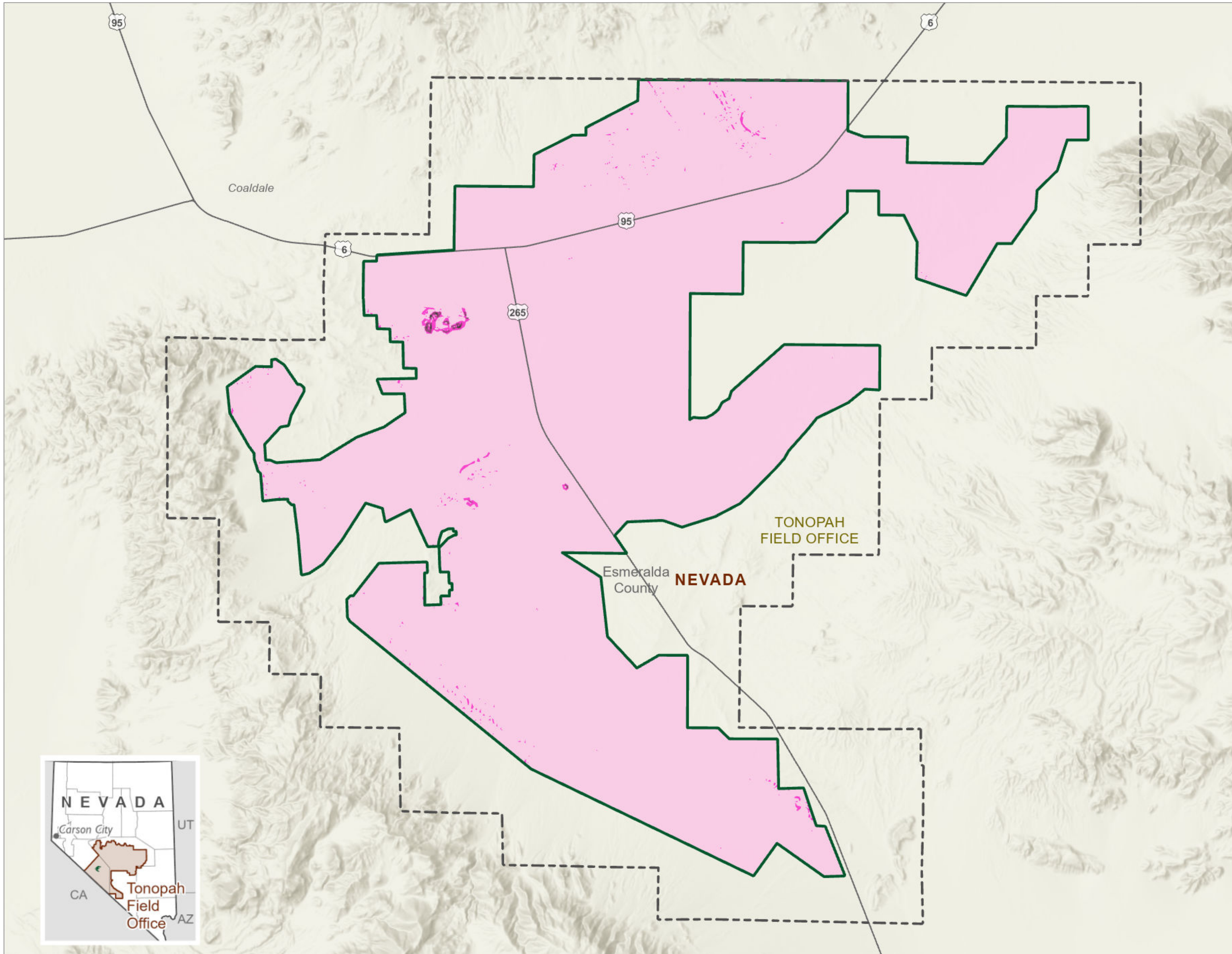

Figure 3-16
Percent Slope

- 0- 5%
- 5-10%
- 10-15%
- 15-20%

- Planning area
- Segregation of public land

0 1 2
Miles

Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office, USGS GIS 2023
June 27, 2024,
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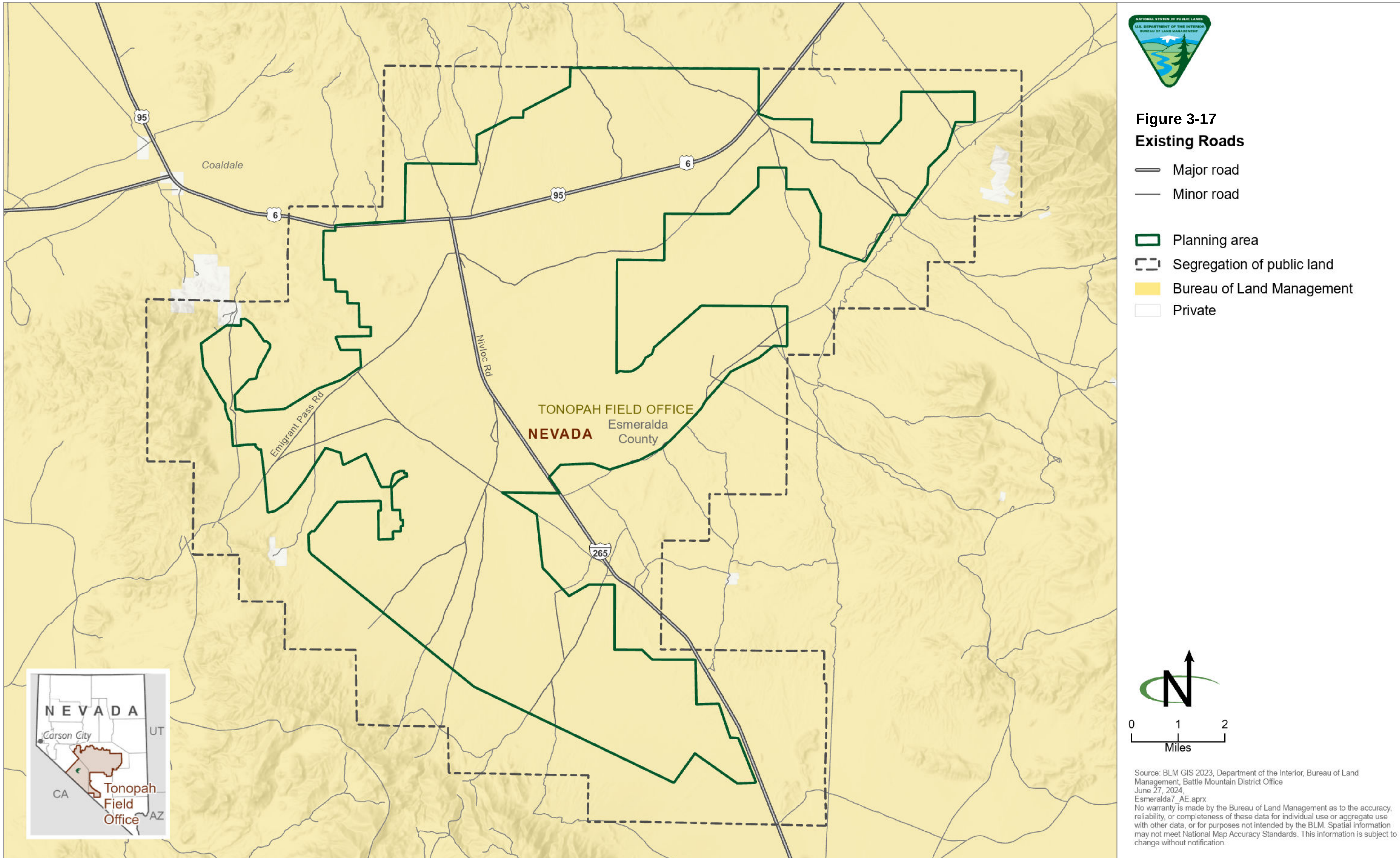
Figure 3-17
Existing Roads
Major road
Minor road
Planning area
Segregation of public land
Bureau of Land Management
Private
95
6
Coaldale
Nivloc Rd
Emigrant Pass Rd
265
TONOPAH FIELD OFFICE
NEVADA
Esmeralda
County
N E V A D A
Carson City
UT
CA
AZ
Tonopah
Field
Office
0
1
2
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
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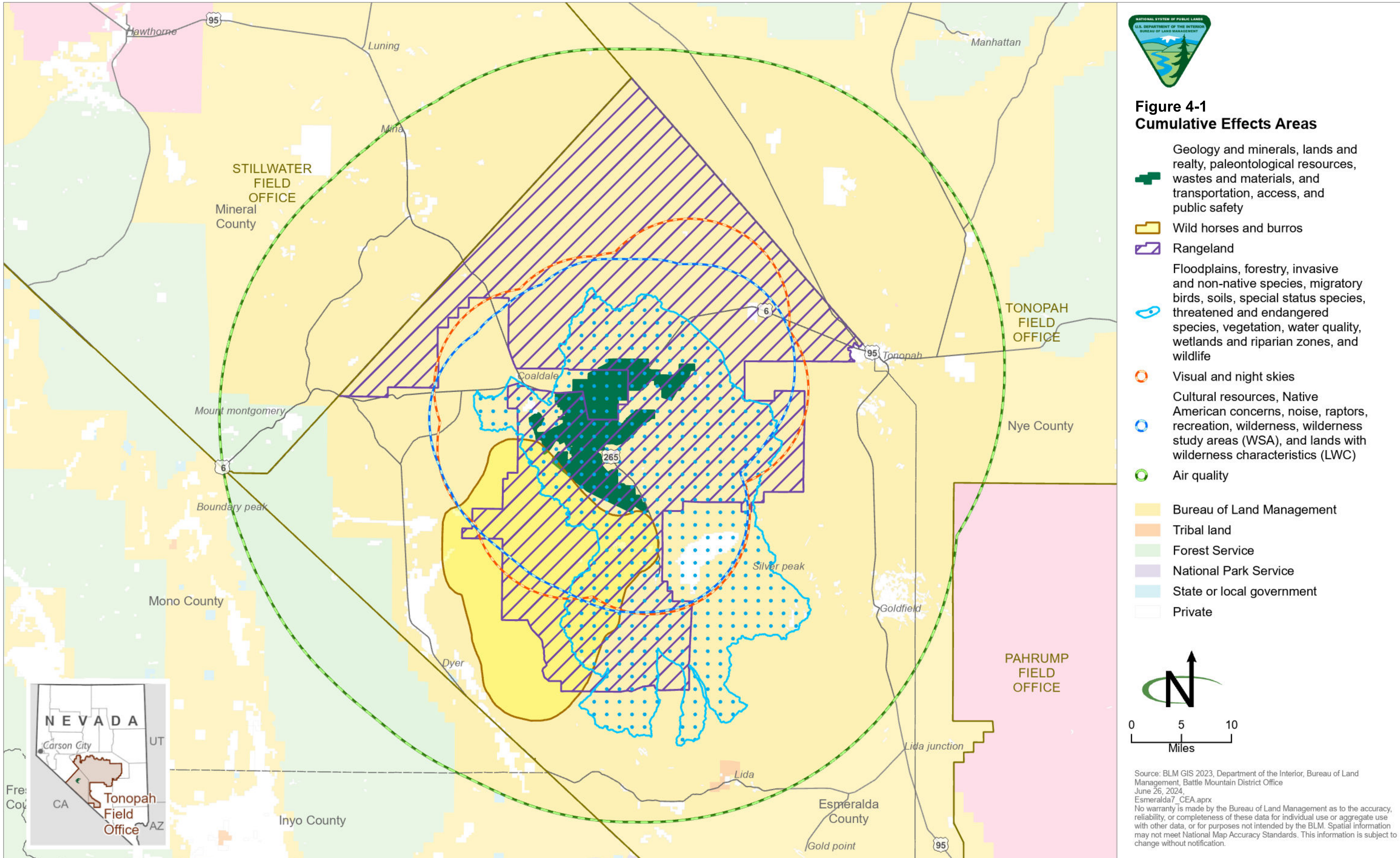
Figure 4-1
Cumulative Effects Areas
Geology and minerals, lands and realty, paleontological resources, wastes and materials, and transportation, access, and public safety
Wild horses and burros
Rangeland
Floodplains, forestry, invasive and non-native species, migratory birds, soils, special status species, threatened and endangered species, vegetation, water quality, wetlands and riparian zones, and wildlife
Visual and night skies
Cultural resources, Native American concerns, noise, raptors, recreation, wilderness, wilderness study areas (WSA), and lands with wilderness characteristics (LWC)
Air quality
Bureau of Land Management
Tribal land
Forest Service
National Park Service
State or local government
Private
0
5
10
Miles
Source: BLM GIS 2023, Department of the Interior, Bureau of Land Management, Battle Mountain District Office
June 26, 2024,
Esmeralda7_CEA.aprx
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STILLWATER FIELD OFFICE
Mineral County
TONOPAH FIELD OFFICE
Nye County
PAHRUMP FIELD OFFICE
Mono County
Inyo County
Esmeralda County
Hawthorne
Luning
Mina
Manhattan
Coaldale
Mount montgomery
Boundary peak
Tonopah
Silver peak
Goldfield
Dyer
Lida
Lida junction
Gold point
95
6
265
NEVADA
Carson City
UT
CA
AZ
Tonopah Field Office

Appendix B
Design Features

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TABLES

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Appendix B. Design Features

As described in the Final Solar Programmatic Environmental Impact Statement and Record of Decision (BLM 2012; PEIS ROD), programmatic design features will be required for all utility-scale solar energy projects on BLM-administered lands. Due to site-specific circumstances, not all design features, as written, will apply to all projects (for example, if a resource is not present on a given site). Some design features may require variations from what is described (for example, a larger or smaller protective area). In some cases, multiple options for addressing a potential resource conflict are provided.

Applicants would be required to work with the BLM to address proposed variations in the design features and to discuss selected options for avoidance, minimization, and mitigation of potential resource conflicts. Variations in programmatic design features would require appropriate analysis and disclosure as part of individual project authorizations. Programmatic design features that do not apply to a given project should be described as part of the project case file along with an appropriate rationale. Additional mitigation measures may be identified and required during individual project development and environmental review.

B.1 Preliminary Air Quality (Air Quality and Climate) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.11.1 and 5.11.2), presented by project phase, have been identified to avoid, minimize, or mitigate potential impacts on ambient air quality and climate from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted, where applicable.

B.1.1 General

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.

(a) Assessing conformance to air quality and other related constraints shall include, but is not limited to, the following:

- Identifying air quality and other related constraints associated with the proposed project site. In coordination with BLM, the appropriate state and local air regulatory authorities shall be consulted to identify air quality and related constraints and requirements.
- Determining any applicable Federal, state, and local laws and regulations related to air quality.
- Considering effects on particulate matter PM_{10} and $PM_{2.5}$ from the solar energy project and its facilities.
- Evaluating potential contributions to air quality impacts as part of the environmental impact analysis for the project and considering options to avoid, minimize and/or mitigate adverse impacts in coordination with the BLM.

B.1.2 Site Characterization, Siting and Design, Construction

AQC2-1 Solar facilities shall be sited and designed, and constructed to minimize impacts on air quality.

(a) Methods to minimize air quality impacts shall include, but are not limited to, the following:

- Using equipment that meets emission standards specified in the state code of regulations and meets the applicable EPA Tier 3 and Tier 4 emissions requirements.
- Preparing a Dust Abatement Plan for the solar facilities that considers multiple methods for dust suppressant (i.e., water, paving, gravel, and/or regulation-compliant palliatives).

(b) Other methods to minimize air quality impacts and related constraints may include, but are not limited to, the following:

- Considering surfacing access roads with aggregate that is hard enough that vehicles cannot crush it.
- Managing unpaved roads, disturbed areas (e.g., areas of scraping, excavation, backfilling, grading, and compacting), and loose materials generated during project activities as frequently as necessary to effectively minimize fugitive dust generation.
- Using machinery that has air-emission-control devices as required by Federal, state, and local regulations or ordinances.
- Limiting travel to stabilized roads.
- Considering paving the main access road to the main power block and the main maintenance building.
- Enforcing posted speed limits (e.g., 10 mph [16 km/hour]) within the construction site to minimize airborne fugitive dust.
- Covering vehicles that transport loose materials as they travel on public roads, using dust suppressants on truck loads, and keeping loads below the freeboard of the truck bed.
- Installing wind fences around disturbed areas that could affect the area beyond the site boundaries (e.g., nearby residences).
- Suspending soil disturbance activities and travel on unpaved roads during periods of high winds. Site-specific wind speed thresholds shall be determined on the basis of soil properties determined during site characterization.
- Utilizing compatible native vegetative plantings to limit dust generation from stockpiles that will be inactive for a relatively long period.
- Considering use of ultra-low sulfur diesel with a sulfur content of 15 parts per million or less for project vehicles.
- Limiting the idling time of equipment to no more than 5 minutes, unless idling must be maintained for proper operation (e.g., drilling, hoisting, and trenching).
- Minimizing use of dust palliatives in areas of close proximity to sensitive soil and streams.
- Accessing transmission lines from public roads and designated routes to minimize fugitive dust emissions.
- Minimizing on-site vehicle use and requiring routine preventive maintenance, including tune-ups to meet the manufacturer's specifications, to ensure efficient combustion and minimal emissions.

- Encouraging use of newer and cleaner equipment that meets more stringent emission controls.
- Limiting access to the construction site and staging areas to authorized vehicles only through the designated treated roads.
- Staging construction to limit the areas exposed at any time.
- Considering inspection and cleaning of tires of all construction-related vehicles to ensure they are free of dirt before they enter paved public roadways.
- Cleaning up visible trackout or runoff dirt on public roadways resulting from the construction site (e.g., street vacuum/ sweeping).
- Salvaging topsoil from all excavations and construction activities during reclamation or interim reclamation and reapplying to construction areas not needed for facility operation as soon as activities in that area have ceased.
- Considering atmospheric conditions when planning construction activities to minimize dust.
- To the extent practicable, avoiding ground disturbance from construction-related activities in areas with intact biological soil crusts and desert pavement. Developers should salvage soil crusts for restoration, on the basis of recommendations by the BLM once construction has been completed.
- Incorporating environmental inspection and monitoring measures into the POD and other relevant plans to monitor and respond to air quality during construction, operations, and decommissioning of a solar energy development, including adaptive management protocols.

B.1.3 Operations and Maintenance

AQC3-1 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.

(a) Methods for maintaining compliance with the terms and conditions for air quality during operations and maintenance shall include, but are not limited to, the following:

- Monitoring and treating areas that have been graded, scraped, bladed, compacted, or denuded of vegetation ahead of actual construction/assembly.

(b) Other methods to maintain compliance with the terms and conditions for air quality during operations and maintenance may include, but are not limited to, the following:

- Reapplying palliatives or water as necessary for effective fugitive dust management.
- Considering use of design features for portions of facilities maintained to be free of vegetation during operations, and use of the dust control design features that were listed above under AQC2-1 to limit fugitive dust emissions during the construction phase to minimize fugitive dust emissions from bare surfaces and unpaved access roads.
- Ensuring compliance of all combustion sources with state emission standards (e.g., best available control technology requirements).

B.2 PRELIMINARY BIOLOGICAL RESOURCES (ECOLOGICAL RESOURCES) DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

Many design features are similar for different types of ecological resources (plant communities and habitats, wildlife, aquatic resources, and special status species)[1]. Design features for avoiding or minimizing impacts on all these types of ecological resources in general and during the various project phases are presented in the following sections. They were identified to avoid, reduce, or mitigate impacts on ecological resources from solar energy development identified and discussed in Section 5.10 of the Draft and Final Solar PEIS.

B.2.1 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.

(a) Assessing compliance with pertinent regulations for ecological resources shall include, but is not limited to, the following:

- Developing in coordination with the BLM and USFWS strategies for complying with regulatory requirements of the Bald and Golden Eagle Act.
- Developing in coordination with appropriate Federal and state agencies (e.g., BLM, USFWS, and state resource management agencies) measures to protect birds (including migratory species protected under the Migratory Bird Treaty Act).
- Contacting appropriate agencies (e.g., BLM, USFWS, and state resource management agencies) early in the project planning process to identify potentially sensitive ecological resources such as aquatic habitats, wetland habitats, unique biological communities, crucial wildlife habitats, and special status species locations and habitats located within or in the vicinity of the areas occupied by the solar energy facility and associated access roads and ROWs.
- Consulting with the US Army Corps of Engineers (USACE) regarding the siting of solar energy generating facilities and energy transmission infrastructure in relation to hydrological features that have the potential to be subject to USACE jurisdiction.
- Considering restrictions on timing and duration of activities developed in coordination with the BLM, USFWS, and other appropriate agencies to minimize impacts from project activities on nesting birds (especially passerines and listed species).
- Considering recommendations contained in Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocol and Other Recommendations in Support of Golden Eagle Management and Permit Issuance (Pagel et al. 2010).
- Adhering to Instruction Memorandum 2010-156, the Bald and Golden Eagle Protection Act—Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for

[1] Special status species include the following types of species: (1) species listed as threatened or endangered under the ESA; (2) species that are proposed for listing, under review, or candidates for listing under the ESA; (3) species that are listed as threatened or endangered by the state or are identified as fully protected by the state; (4) species that are listed by the BLM as sensitive; and (5) species that have been ranked S1 or S2 by the state or as species of concern by the state or USFWS. Note that some of the categories of species included here do not fit BLM's definition of special status species as defined in BLM Manual 6840. These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

Renewable Energy, until programmatic permits from the USFWS are available.[2] The analysis of potential impacts on, and mitigation for, golden eagles shall be made in coordination with the USFWS.

- Avoiding take of golden eagles and other raptors. Mitigation regarding the golden eagle shall be developed in consultation with the USFWS and appropriate state natural resource agencies. A permit may be required under the Bald and Golden Eagle Protection Act.
- Discussing potential impacts on sensitive habitats resulting from operation of vehicles and construction of structures, including transmission lines, within the environmental analysis.

(b) Methods to minimize regulatory conflicts for ecological resources may include, but are not limited to, the following:

- Including submittal of a jurisdictional delineation for consultation with the USACE, in accordance with the 1987 wetlands delineation manual and appropriate regional supplement; avoidance, minimization and compensation proposals.
- Identifying a Least Environmentally Damaging Practicable Alternative and analyzing within the environmental analysis. A USACE permit, Nationwide verification, or approved jurisdiction letter shall be provided to the BLM prior to a decision.
- Developing measures to ensure protection of raptors in coordination with appropriate Federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).
- Developing measures to ensure protection of bats in coordination with appropriate Federal and state agencies (e.g., BLM, USFWS, and state resource agencies).
- Developing measures to ensure mitigation and monitoring of impacts on special status species in coordination with appropriate Federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).
- Consulting with the USFWS upon discovery of federally listed threatened and endangered species during any phase of the project. An appropriate course of action shall be determined to avoid, minimize, or mitigate impacts. All applicable terms and conditions and conservation measures listed in the programmatic Biological Opinion, issued by the USFWS, shall be followed.
- Informing project personnel that only qualified biologists are permitted to handle listed species according to specialized protocols approved by the USFWS.
- Considering plants, wildlife, and their habitats in the facility's Dust Abatement Plan.
- Limiting herbicide use to non-persistent, immobile substances. Only herbicides with low toxicity to wildlife and non-target native plant species shall be used, as determined in consultation with the USFWS. Section 5.10.2.1.5 of the Draft Solar PEIS discusses the potential impacts of herbicides on wildlife. All herbicides shall be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final Solar PEIS on vegetation treatments using herbicides. Prior to application of herbicide treatments, a qualified person, such as a biologist, shall conduct surveys of bird nests and of special status species to identify the special measures or BMPs necessary to avoid and minimize impacts on migratory birds and special status species.

[2] This has been replaced by BLM Instruction Memorandum 2017-040 *Bald and Golden Eagle Protection Act – Eagle Incidental Take Permit Guidance for Renewable Energy Development*

- Developing a SWPPP for each project that avoids, to the extent practicable, changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in the alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including the alteration of cover and community structure, species composition, and diversity) off the project site.
- Utilizing block or check valves on both sides of the waterway or habitat to minimize product release from pipelines that transport hazardous liquids (e.g., oils) that pass through aquatic or other habitats. Such pipelines shall be constructed of double-walled pipe at river crossings.
- Considering compensatory mitigation and monitoring of significant direct, indirect, and cumulative impacts on, and loss of habitat for, special status plant and animal species.
- Incorporating key elements on the identification and protection of ecological resources (especially for special status species), including knowledge of required design features, in instructions to all personnel. Incorporate the knowledge into a Worker Education and Awareness Plan (WEAP) that is provided to all project personnel prior to entering the project worksite. The WEAP shall be provided on a regular basis, so as to ensure the continued ecological awareness of the project worksite during all phases of the project's life. The base information the WEAP provides shall be reviewed and approved by the BLM prior to the issuance of a Notice to Proceed and incorporate adaptive management protocols for addressing ecological changes over the life of the project, should they occur.
- Planning for vegetation management that is consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species (Sections 5.10.1.1.2 and 5.10.1.1.4 of the Draft Solar PEIS discuss the need for local and regional native plants in revegetation and restoration).
- Developing measures for fire management and protection that minimize the potential for a human- or facility-caused fire to affect ecological resources and that respond to natural fire situations (Sections 5.10.1.1.2 and 5.10.1.1.3 of the Draft Solar PEIS discuss the potential impacts of fire on native plant communities).
- Developing measures to investigate the possibility of revegetating parts of the solar array area.
- Designating a qualified biologist who will be responsible for overseeing compliance with all design features related to the protection of ecological resources throughout all project phases, particularly in areas requiring avoidance or containing sensitive biological resources. This person shall be reviewed and approved by the USFWS and the BLM for designation as a qualified biologist.
- Conducting pre-construction surveys, in coordination with BLM, USFWS, and state agency statutes, programs, and policies.
- Conducting seasonally appropriate inspections by a qualified biologist or team of biologists to ensure that important or sensitive species or habitats are not present. Attendees at the inspections may include appropriate Federal agency representatives, state natural resource agencies, and construction contractors, as appropriate. Habitats or locations to be avoided shall be clearly marked.

B.2.2 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.

(a) Methods to avoid, minimize, or mitigate impacts on ecological resources may include, but are not limited to the following:

- Siting and designing projects to avoid and minimize direct and indirect impacts on important, sensitive, or unique habitats in the project vicinity, including, but not limited to waters of the United States, wetlands (both jurisdictional and non-jurisdictional), springs, seeps, streams (ephemeral, intermittent, and perennial), 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare or unique biological communities, crucial wildlife habitats, and habitats supporting special status species populations (including designated and proposed critical habitat).

Reducing the attractiveness of solar energy development and infrastructure areas to opportunistic predators such as desert kit fox, coyotes, and common ravens. Examples include, but are not limited to, litter control programs; measures to discourage the presence of ravens on-site, including elimination of available water sources; designing structures to discourage their use as potential nest sites; use of hazing to discourage raven presence; and active monitoring of the site for presence of ravens.

- Avoiding siting projects in designated critical habitat, ACECs, or other specially designated areas that are identified as necessary for special status species and habitat conservation.
- Considering siting projects on previously disturbed lands in close proximity to energy load centers to avoid and minimize impacts on remote, undisturbed lands.
- Designing project facilities to reduce the number of stream crossings within a particular stream or watershed (e.g., access roads and utilities could share common ROWs, where feasible), and locating facilities in pre-disturbed areas to reduce potential for habitat fragmentation.
- Preventing establishment and spread of invasive species and noxious weeds within the ROW and in associated areas where there is ground surface disturbance or vegetation cutting. Developers should consider siting project facilities and activities, including associated roads and utility corridors, out of occupied habitats of special status animal species.
- Determining, in coordination with appropriate Federal and state agencies, the translocation of special status species, including the steps to implement the translocation and the follow-up monitoring of populations in the receptor locations, as determined in coordination with the appropriate Federal and state agencies. Developers should plan for translocation of special status species when appropriate.
- Considering the salvage of Joshua trees (*Yucca brevifolia*), other Yucca species, and most cactus species in coordination with the local BLM field office.
- Considering conducting interim and final restoration activities as soon as possible after development activities are completed in order to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.
- Implementing revegetation, soil stabilization, and erosion reduction measures to ensure temporary use areas are restored.

- Conducting a nesting bird survey or other necessary survey for nesting birds. If active nests are detected, the nest area shall be flagged, and no activity shall take place near the nest (at a distance determined by the BLM in coordination with the USFWS and/or appropriate state agencies), or until the appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures.
- Siting and designing project activities away from habitats occupied by special status animal species. Developers should consider establishing buffers around sensitive habitats to prevent destructive impacts associated with project activities (e.g., identified in the land use plan or substantiated by best available information or science in consultation with the BLM).
- To the extent practicable, avoiding entry into aquatic habitats, such as streams and springs, during site characterization activities until surveys by qualified biologists have evaluated the potential for unique flora and fauna to be present.
- Planning for and developing measures that identify management practices to minimize increases in nuisance animals and pests. The plans should identify nuisance and pest species that are likely to occur in the area, risks associated with these species, species-specific control measures, and monitoring requirements.
- Designing solar facilities to avoid, minimize, and mitigate impacts on wetlands, waters of the United States, and other special aquatic sites.
- Locating and designing individual project facilities to minimize disruption of animal movement patterns and connectivity of habitats. Section 5.10.2.1.2 of the Draft Solar PEIS discusses the potential impacts of habitat loss and fragmentation on wildlife.
- Avoiding surface water or groundwater withdrawals that adversely affect sensitive habitats (e.g., aquatic, wetland, playa, microphyll woodland, and riparian habitats) and habitats occupied by special status species.
- Designing water intake facilities to minimize the potential for aquatic organisms from surface waters to be entrained in cooling water systems.
- Demonstrating, through hydrologic modeling, that the withdrawals required for the project are not going to affect groundwater discharges that support special status species or their habitats.
- Considering the use of fencing and netting for evaporation ponds to prevent their use by wildlife.
- To the extent practicable, locating meteorological towers, solar sensors, soil borings, wells, and travel routes to avoid sensitive habitats or areas where wildlife (e.g., sage-grouse) is known to be sensitive to human activities.
- To the extent practicable, avoiding siting solar power facilities near open water or other areas that are known to attract large numbers of birds.
- To the extent practicable, placing tall structures, such as meteorological towers and solar power towers, to avoid known flight paths of birds and bats.
- Implementing current guidelines and methodologies in the design and analysis of proposed transmission facilities in order to minimize the potential for raptors and other birds to collide or be electrocuted by them.
- Placing mechanisms to visually warn birds (permanent markers or bird flight diverters) on transmission lines at regular intervals to prevent birds from colliding with the lines.

- Designing transmission line support structures and other facility structures to discourage use by raptors for perching or nesting (e.g., by using monopoles rather than lattice support structures or by use of anti-perching devices).
- Considering spanning important or sensitive habitats with transmission line conductors within the limits of standard structure design.
- Using low-water crossings (fords) during the driest time of the year. Developers should consider using rocked approaches to fords and returning the crossing to pre-existing stream channel conditions after the need for a low-water ford has passed.
- Employing noise reduction devices (e.g., mufflers) to minimize the impacts on wildlife and special status species populations. Explosives shall be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the BLM or other Federal and state agencies.
- Minimizing the number of areas where wildlife could hide or be trapped (e.g., open sheds, pits, uncovered basins, and laydown areas). Movement of a discovered special status species that is hidden or trapped is prohibited. If necessary, the animal should be moved only to remove the animal from the path of harmful activity, until the animal can escape.
- Implementing measures for proper trash removal and storage, such as using secured containers and periodic emptying, on the project site to reduce attractive opportunistic species, such as common ravens, coyotes, and feral cats and dogs.
- Constructing, improving, and maintaining access roads to minimize potential wildlife/vehicle collisions and facilitate wildlife movement through the area.
- Limiting project vehicle speeds and using shuttle vans and carpooling in areas occupied by special status animal species. Traffic shall yield to wildlife, allowing safe road crossing.
- Utilizing existing access roads, utility corridors, and other infrastructure to the maximum extent feasible.
- Locating staging and parking areas within the site of the utility-scale solar energy facility to minimize habitat disturbance.
- Considering rolled and compacted on-site construction access routes to allow trucks and equipment to access construction locations.
- Minimizing vehicle use off of access roads and foot traffic through undisturbed areas.
- Constructing fences (as practicable) to exclude livestock and wildlife from project facilities.
- Prohibiting project personnel from bringing firearms and pets to project sites.
- Placing food refuse and other garbage in closed containers so it is not available to scavengers.
- Reducing the collection, harassment, or disturbance of plants, wildlife, and their habitats (particularly special status species) through employee and contractor education about applicable state and Federal laws.
- Advising personnel to minimize stopping and exiting their vehicles in the winter ranges of large game while there is snow on the ground.
- Coordinating with BLM and appropriate project personnel to handle unreasonable traffic delays caused by wildlife in roads. Utilizing appropriate personnel to move live, injured, or dead wildlife off roads, ROWs, or the project site.

- Reporting any vehicle-wildlife collisions. Observations of potential wildlife problems, including wildlife mortality, shall be immediately reported to the BLM or other appropriate agency authorized officer.
- Considering road closures or other travel modifications (e.g., lower speed limits, no foot travel) during crucial periods (e.g., extreme winter conditions, calving/fawning seasons, raptor nesting).
- Conducting pre-construction surveys by qualified personnel, such as a qualified biologist, in areas with potential to adversely affect special status species (Section 5.10.4.1.1 of the Draft Solar PEIS) and utilizing approved survey techniques or established species-specific survey protocols to determine the presence of special status species in the area.
- Considering the number of qualified biological monitors (as determined by the Federal authorizing agency and USFWS) to be on-site during initial site preparation and during the construction period to monitor, capture, and relocate animals that could be harmed and are unable to leave the site on their own.
- Relocating wildlife found in harm's way from the area of the activity. Qualified personnel shall be required to relocate some animals such as rattlesnakes.
- Establishing a controlled inspection and cleaning area to visually inspect construction equipment arriving at the area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
- To the extent practicable, avoiding placement of transmission towers within aquatic and wetland habitats, or other sensitive habitats such as riparian habitats. If towers must be placed within these habitats, they shall be designed and installed to not impede flows or fish passage.
- Considering the use of helicopters where access roads do not exist or where access roads could not be constructed without significantly impacting habitats.

B.2.3 Operations 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*,[3] 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.

(a) Methods to manage vegetation, including controlling for invasive species, during operations and maintenance of the project may include, but are not limited to, the following:

- Using certified weed-free seed and mulching.
- Cleaning vehicles to avoid introducing invasive weeds.
- Educating project personnel on weed identification, the manner in which weeds spread, and methods for treating infestations.
- Considering periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas.

[3] Also see the *Vegetation Treatments Using Aminopyralid Fluroxypyr and Rimsulfuron on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (BLM 2016)

- Limiting vegetation maintenance and performing maintenance mechanically rather than with herbicides.
- Considering retaining short (i.e., less than 7-in. [18-cm] tall) native species during maintenance and operation activities.
- Monitoring for and eradicating invasive species.
- Reestablishing vegetation within temporarily disturbed areas immediately following the completion of construction activities.
- Focusing revegetation efforts on the establishment of native plant communities similar to those present in the vicinity of the project site. Considering dominant native species within the plant communities that exist in adjacent areas and have similar soil conditions for revegetation.
- Considering post-translocation surveys for target species (especially if the target species are special status species) and releasing individuals to protected off-site locations as approved by Federal and state agencies.

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.

(a) Methods to minimize impacts on ecological resources during operations and maintenance of the project shall include, but are not limited to, the following:

- Monitoring for increase in predation of special status species from ravens and other species that are attracted to developed areas and use tall structures opportunistically to spot vulnerable prey.
- Turning off all unnecessary lighting at night to limit attracting wildlife, particularly migratory birds.

(b) Other methods for maintaining compliance with ecological resource design elements during operations and maintenance of the project may include, but are not limited to, the following:

- Monitoring for and reporting bird mortality species (e.g., raptors) that are associated with power lines to the BLM and the USFWS.
- Monitoring for the effects of groundwater withdrawals on plant communities.
- Monitoring unavoidable impacts on wetlands and waters of the United States.
- Removing raptor nests only if the birds are not actively using the nest.
- Considering relocating nests to nesting platforms. Reporting on relocated or destroyed nests to the appropriate Federal and/or state agencies.
- Coordinating with the USFWS and BLM project personnel in the event that a raptor nest is located on a transmission line support structure.
- Removing raven nests only when inactive (i.e., no eggs or young). The removal of raven nests may be addressed in the minimization measures that incorporate the most current USFWS guidance (e.g., FONSI, *Implementation of a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise, 2008*).
- Considering trench breakers and/or sealing the trench bottom to maintain the original wetland hydrology where a pipeline trench drains a wetland.

- Minimizing removal of deadfall or overhanging vegetation in streams for crossings.
- Maintaining areas left in a natural condition during construction (e.g., wildlife crossings) in as natural a condition as possible within safety and operational constraints.
- Avoiding use of guy wires to minimize impacts on birds and bats. If guy wires are necessary, permanent markers (e.g., bird flight diverters) shall be used to increase their visibility.
- Maintaining native vegetation cover and soils and minimizing grading.
- Monitoring unavoidable impacts on wetlands and waters of the United States.
- Instructing personnel to avoid harassment and disturbance of local plants and wildlife.
- Informing personnel of the potential for wildlife interactions around facility structures.

B.2.4 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.

(a) Addressing ecological resource impacts during reclamation and decommissioning shall include, but is not limited to, the following:

- Applying design features developed for the construction phase to similar activities during the decommissioning and reclamation phase.
- Developing and implementing a Decommissioning and Site Reclamation Plan specific to the project, approved by the BLM in consultation with appropriate agencies, that incorporates adaptive management strategies.
- Using weed-free seed mixes of native shrubs, grasses, and forbs of local sources where available, as required in the Decommissioning and Site Reclamation Plan.
- Developing and implementing monitoring measures to ensure successful reclamation per the Decommissioning and Site Reclamation Plan.

(b) Other methods to minimize ecological resource impacts during reclamation and decommissioning may include, but are not limited to, the following:

- Lightly raking and/or ripping and reseeding with seeds from low-stature plant species collected from the immediate vicinity in disturbed areas.
- Reclaiming access roads when they are no longer needed, considering seasonal restrictions.
- Filling or grading holes and ruts created by the removal of structures and access roads.
- Considering maximizing area reclaimed during solar energy operations to minimize habitat loss and fragmentation.
- Maintaining a clean and orderly worksite during and after decommissioning to ensure land is clear of debris.
- Planning to return land surfaces to pre-development contours immediately following decommissioning.
- Expediting the reestablishment of vegetation for site stabilization.
- Continuing vegetation reestablishment efforts until all success criteria have been met, as identified within the Decommissioning and Site Reclamation Plan.

- Focusing revegetation on the establishment of native plant communities similar to those present in the vicinity of the project site. Considering dominant native species within the plant communities that exist in adjacent areas and have similar soil conditions for revegetation.
- Leaving the facility fencing in place for several years, or replacing it with new exclusion fencing, to assist reclamation (e.g., the fence could preclude large mammals and vehicles from disturbing revegetation efforts). Shorter times for maintaining fencing may be appropriate in cases where the likelihood of disturbance by cattle and wildlife is low.

B.2.5 Other Programmatic Design Features

The BLM may require the additional design features listed in **Table B-1**, as applicable.

NOTE: Design features listed in the table below are also under review by the BLM and are not final.

Table B-1. Programmatic Design Features for Biological Resources

Description of Measure	Purpose	Applied Phases
Any structures that require lighting for aviation safety would comply with the USFWS communications tower guidance (Recommended Best Practices for Communication Tower Design, Siting, Construction, Operation, Maintenance, and Decommissioning).	Avoid or minimize project effects on avian and bat species	Siting and design, construction, operations and maintenance
Recommendations contained in the Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocol; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance (Pagel et al. 2010), as augmented by the Interim Golden Eagle Breeding Survey Recommendations in Nevada: FWS R8 Migratory Birds June 13, 2023, should be considered in project planning, as appropriate. Additionally, the applicant would need to adhere to BLM Instruction Memorandum IM 2017-040 (Bald and Golden Eagle Protection Act – Eagle Incidental Take Permit Guidance for Renewable Energy Development). If eagle take cannot be avoided during construction, the appropriate type of permit would be obtained in accordance with the final rule "Permits for Incidental Take of Eagles and Eagle Nests" (89 *Federal Register* 9920; 50 CFR parts 13 and 22) which became effective on April 12, 2024.	Avoid or minimize take of golden eagles and comply with the Bald and Golden Eagle Protection Act	Siting and design, construction, operations and maintenance
In adherence with BLM Instruction Memorandum IM 2023-005 (Habitat Connectivity on Public Lands), applicants should assess and identify areas of habitat connectivity that support or facilitate priority species' movements and other ecological processes, such as seed dispersal, migrations, and stopover sites. Projects should incorporate measures to conserve and maintain existing habitat connectivity in the planning area.	Conserve and maintain habitat connectivity on public lands	Siting and design, construction, operations and maintenance

Description of Measure	Purpose	Applied Phases
In adherence with BLM Manual MS-6840, Special Status Species Management (2008), to confirm the presence or absence of special status plant and wildlife species, the applicant would carry out pre-implementation surveys for special status plant and wildlife species in suitable habitat areas where surface-disturbing activities are proposed. Survey methods would be determined in coordination with the BLM Authorized Officer and agreed upon prior to surveys. If special status wildlife species are found to be present, the BLM Authorized Officer would determine measures to avoid negative effects during project implementation.	Avoid or minimize project effects on special status species	Siting and design, construction, operations and maintenance
All herbicides would be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEISs for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (BLM 2007) and Vegetation Treatments Using Aminopyralid Fluroxypyr and Rimsulfuron on Bureau of Land Management Lands in 17 Western States (BLM 2016).	Avoid or minimize project effects on ecological resources during vegetation management activities	Construction, operations and maintenance

Sources: As cited in the table

B.2.6 Other Programmatic Best Management Practices

The BLM may require the additional BMPs listed in **Table B-2**, as applicable.

NOTE: The BMPs listed in the table below are also under review by the BLM and are not final.

Table B-2. Best Management Practices

Topic	Description
Staging areas	As practical, staging and parking areas would be located within the site of the utility-scale renewable energy facility to minimize habitat disturbance in areas adjacent to the site.
Construction	Before beginning construction, the PLSS and Mineral Survey markers will be protected in accordance with H-9600-1, Cadastral Survey Handbook, Chapter 1, section 2, Standard Stipulation - Protection of Survey Corner and Boundary Line Markers.
Construction	Before beginning construction, the applicant would delineate the boundaries of areas to be disturbed using temporary construction fencing or flagging, or both. The disturbances, project vehicles, and equipment would be confined to the delineated project areas.
Construction	To the extent practicable, work personnel would stay within the ROW or easements, or both.

Topic	Description
Construction	Before beginning construction, the applicant would prepare an access management plan to manage access within the disturbance area. The plan would include access planning and management for internal travel within panel arrays during construction, operations and maintenance, and decommissioning. The plan would be designed to minimize impacts from vehicle traffic on soils, vegetation, and wildlife habitat throughout the lifetime of the project. Specific measures to consider would include: • Assemble as much of the solar array structure as possible in laydown areas, which would minimize travel along panel rows. • Designate primary travel routes between panel arrays to minimize disturbance in other rows. Keep disturbance to one primary travel path to avoid zigzagging between array rows. • Ensure that there are well-trained construction monitors on site focused on ensuring that construction/vehicle trips impacts are minimized. • Utilize smaller rubber-wheeled vehicles, lightweight skid steers, small cranes, tractors, and rubber-tired forklifts to minimize soil disturbance. • Mount batteries, transformers, and inverters on elevated platforms using steel skids or piers to allow soils underneath to remain pervious, preserve site hydrology. • Incorporate propagule islands (patches of intact vegetation and soils that provide seeds and soil microbial propagules) to facilitate revegetation or recolonization of adjacent disturbed areas.
Construction	Coordinate with the BLM, USFWS, NDOW, and state agency statutes, programs, and policies when conducting pre-construction surveys.
Construction	Developers should plan for translocation of special status species when appropriate and biologically feasible. This would be determined in coordination with appropriate Federal and state agencies.
Fugitive dust	If the application of water is needed to abate dust in construction areas and on dirt roads, the developer would use the least amount of water needed to meet safety and air quality standards and to prevent the formation of puddles, which could attract wildlife to construction sites.
Traffic	Existing access roads, utility corridors, and other infrastructure would be used to the maximum extent feasible.
Traffic	Plant species that would attract wildlife would not be planted along high-speed or high-traffic roads.
Noise	Construction- and operation-related noise levels would be minimized to minimize impacts on wildlife.
Habitat	To reduce the extent of habitat disturbance during construction and operation, existing access roads, utility corridors, and other infrastructure would be used to the maximum extent feasible. Foot and vehicle traffic through undisturbed areas would be minimized.
Habitat	Where feasible, vegetation should be mowed to accommodate proposed solar fields, rather than removed by grading. This would retain the soil seed bank to facilitate the eventual recovery of vegetation. Mowed plants that do continue to grow within solar fields would be expected to provide various types of wildlife habitat function, though reduced in quality.
Habitat	Areas left in a natural condition during construction (such as wildlife crossings) would be maintained in as natural a condition as possible within safety and operational constraints.
Habitat	Habitat loss, habitat fragmentation, and resulting edge habitat due to project development would be minimized to the extent practicable. Habitat fragmentation could be reduced by consolidating facilities (for example, access roads and utilities could share common ROWs, where feasible). This would reduce the number of access roads to the minimum amount required, minimize the number of stream crossings within a particular stream or watershed, and locate facilities in areas where habitat disturbance has already occurred. Individual project facilities would be located and designed to minimize disruption of animal movement patterns and connectivity of habitats.

Topic	Description
Habitat	The number of areas where wildlife could hide or be trapped (such as open sheds, pits, uncovered basins, and laydown areas) would be minimized. All pits would contain wildlife escape ramps. For example, an uncovered pipe placed in a trench would be capped at the end of each workday to prevent animals from entering the pipe. If a special status species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity, until the animal has escaped.
Birds and bats	Tall structures would be located to avoid known flight paths of birds and bats.
Birds and bats	Consider the use of fencing and netting for evaporation ponds to prevent their use by wildlife where water quality may harm wildlife.
Birds and raptors	Project proponents should establish buffer zones and protection, mitigation, and monitoring plans for active nests detected during surveys.
Birds and raptors	All nest removal, including for raven control, would be done in coordination with the USFWS and NDOW.
Bi-State Sage-grouse	If construction is proposed within 3 miles of an active Bi-State sage grouse lek (active or pending status), consider incorporating the following measures: • Conduct construction activities from July 15 to November 30 to avoid disturbing Bi-State sage-grouse during the breeding, nesting, early brood rearing and winter periods. • If facility maintenance within 3 miles of an active Bi-State sage-grouse lek is necessary, conduct all activity at least 2 hours after local sunrise. • Noise should be limited to less than 10 decibels above ambient measures from 2 hours before until 2 hours after sunrise at the perimeter of an active or pending status lek during active lekking season. • Vehicle trips should be limited to those times that would least impact nesting or wintering grouse. Vehicle trips should not occur on a regular basis within 3 miles of an active or pending lek or in identified nesting habitats from March 1 through May 15. If vehicle trips are required during the lekking period, vehicles should only be operated from 10:00 a.m. to 5:00 p.m. daily.
Bi-State Sage-grouse	Structures should be constructed with the least amount of perching or nesting substrate possible by avoiding such things as external ladders and platforms. Perching and nest deterrents could be incorporated, and include: • devices installed on support towers; • actual physical maintenance through hazing; and/or • physical removal of nest structures in coordination with the NDOW and USFWS.
Bi-State Sage-grouse	To reduce the impact of new fences on Bi-State sage-grouse, new fence proposals should be carefully evaluated for Bi-State sage-grouse collision risk.
Special status species	In consultation with permitting agencies, special status species or unique plant assemblages would be avoided when installing and maintaining transmission line towers and poles, access roads, pulling sites, and storage and parking areas adjacent to linear facilities.
Special status species	During all project phases, buffer zones would be established around sensitive habitats, and project facilities and activities would be excluded or modified within those areas, to the extent practicable.
Waste	Construction debris, especially treated wood, would not be stored or disposed of in areas where it could come in contact with aquatic habitats.

B.3 PRELIMINARY CULTURAL RESOURCES DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

The following design features from the Final Solar PEIS ROD (BLM 2012; Sections 5.15.1 and 5.15.2), presented by project phase, have been identified to avoid, minimize, or mitigate potential impacts on cultural resources from solar energy development. As described in the Solar PEIS ROD, programmatic design features will be required for all utility-scale solar energy projects on BLM-administered lands. Due to site-specific circumstances, not all design features, as written, will apply to all projects (for example, if a resource is not present on a given site). Some design features may require variations from what is described (for example, a larger or smaller protective area). In some cases, multiple options for addressing a potential resource conflict are provided.

B.3.1 General

CR1-1 Project developers shall coordinate with the BLM early in the planning process to identify and minimize cultural resource impacts; the BLM will consult with other Federal, tribal, state, and local agencies as appropriate.

(a) Determining cultural resource impacts shall include, but is not limited to, the following:

- Initiating Section 106 consultations between the BLM, SHPOs, Indian tribes, and other consulting parties early in the project planning process. Thresholds for the involvement of and review by the Advisory Council on Historic Preservation (ACHP) include non-routine interstate and/or interagency projects or programs; undertakings adversely affecting National Historic Landmarks; undertakings that the BLM determines to be highly controversial; and undertakings that will have an adverse effect and with respect to which disputes cannot be resolved through formal agreement between the BLM and SHPO, such as a Memorandum of Agreement (MOA).
- Conducting site-specific Section 106 review for individual projects. The BLM will require the completion of inventory, evaluation, determinations of effect, and treatment in accordance with the Solar Programmatic Agreement. This Solar Programmatic Agreement is titled "Programmatic Agreement among the United States Department of the Interior, Bureau of Land Management, the Arizona State Historic Preservation Officer, the California State Historic Preservation Officer, the Colorado State Historic Preservation Officer, the New Mexico State Historic Preservation Officer, the Nevada State Historic Preservation Officer, the Utah State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding Solar Energy Development on Lands Administered by the Bureau of Land Management."

(b) General methods to minimize cultural resource impacts may include, but are not limited to, the following:

- If historic properties that could be adversely affected are present in the project location, developing an MOA tiered to the Solar PA to address the mitigation steps that will be followed to avoid, minimize, or mitigate adverse effects on historic properties.
- Where the BLM determines that a specific proposed solar energy project has the potential to adversely affect historic properties but those effects cannot be determined prior to its approval, the BLM may elect to review a proposed solar energy project using an undertaking-specific PA executed pursuant to 36 CFR 800.6, instead of following the procedures outlined in the overarching Solar PA.
- Using training/educational programs for solar company workers to reduce occurrences of disturbances, vandalism, and harm to nearby historic properties. The specifics of these sensitivity training programs shall be established in project-specific consultations between the applicant, BLM, SHPO, and affected Indian tribes, and will be articulated in a WEAP (worker awareness environmental program). Such education and awareness plans will incorporate adaptive management protocols for addressing changes over the life of the project, should they occur.

- Securing a performance and reclamation bond for all solar energy generation facilities to ensure compliance with the terms and conditions of the ROW authorization. When establishing bond amounts and conditions, the BLM authorized officer shall require coverage of all expenses tied to cultural resources identification, protection, and mitigation. These may include, but are not limited to, costs for ethnographic studies, inventory, testing, geomorphological studies, data recovery, curation, monitoring, treatment of damaged sites, and generation and submission of reports (see ROW authorization policies, Section 2.2.1.1 of the Final Solar PEIS).

B.3.2 Site Characterization, Siting and Design, Construction

CR2-1 Solar facilities shall be characterized, sited and designed, and constructed in coordination with the BLM to minimize cultural resource impacts.

(a) Methods to minimize impacts on cultural resources shall include, but are not limited to, the following:

- The BLM determining the APE for each proposed solar energy project, to include a review of existing information, and efforts to seek information from and views of tribes and other parties likely to have knowledge of or concerns with historic properties in the APE. This information will be supplemented by discussions at pre-application meetings with the solar energy project applicant, SHPO, and affected tribes regarding project designs, sacred sites, traditional cultural properties (TCPs), and proposed cultural resource inventory strategies.
- The BLM consulting the SHPO, affected tribes (regarding the treatment of adverse effects for those property types on which the tribes indicate at pre-application or other meetings they wish to provide input), and any other consulting parties, if National Register of Historic Places (NRHP)-eligible properties are present at the site and would be adversely affected. The BLM will seek agreement to avoid, minimize, or mitigate adverse effects on historic properties. The BLM will execute an MOA with the SHPO to conclude the Section 106 process and will file a copy with the ACHP. Where the BLM and the SHPO are unable to execute an MOA, the BLM will invite the ACHP to participate in an undertaking-specific MOA. The MOA will specify the treatment for which the BLM will be responsible, and which will be implemented by the solar applicant.
- Undertaking a Class III inventory of the APE. If the BLM decides to require less than a Class III inventory for the entire APE, the BLM will seek additional views of the SHPO, affected tribes, and other parties and determine the final inventory strategy that best represents a reasonable and good-faith effort to carry out appropriate identification efforts.
- Conducting inventories according to the standards set forth in the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716); BLM Handbook H-8110 (Handbook for Identifying Cultural Resources); revised BLM Manual 8110; and applicable BLM or SHPO survey, site record, or reporting standards. All inventory data must be provided to the BLM in digitized or paper format that meets BLM accuracy standards, including shape files for surveyed areas.
- Bringing any unexpected discovery of cultural resources during any phase of development (construction, operations and maintenance, or decommissioning) to the attention of the responsible BLM authorized officer immediately, as specified in the PA. Work shall be halted in the vicinity of the find. The area of the find shall be protected to ensure that the resources are not removed, handled, altered, or damaged while they are being evaluated and to ensure that appropriate mitigative or protective measures can be developed and implemented.

(b) Methods to minimize cultural resource impacts may include, but are not limited to, the following:

- Including in the MOAs measures for management of historic properties, in situations where historic properties require management or monitoring for avoidance and protection within or near a project's boundaries. Such measures will specify the preparation and implementation of steps to lessen the adverse effects of the undertaking upon those aspects of NRHP eligibility criteria that make the historic properties eligible for nomination to the NRHP.
- Requiring that surface disturbance be restricted or prohibited within the viewshed of such property types when their eligibility is tied to their visual setting to protect NRHP-eligible traditional cultural properties, sacred sites, or historic trails from visual intrusion and to maintain the integrity of their historic setting unless acceptable mitigation is proposed.
- Employing cultural field monitors (appropriate for the resource anticipated) to monitor ground-disturbing activities (for example in geomorphic settings, such as in shifting sands, where buried deposits may be present) in cases where there is a probability of encountering cultural resources during construction that could not be detected during prior Class III inventories. Monitoring plans shall be specified within MOAs.
- Encouraging the use of previously disturbed lands and lands determined by archeological inventories to be devoid of historic properties.

B.3.3 Reclamation and Decommissioning

CR3-1 Prior to reclamation activities, the BLM may require further planning for treatment of historic properties or planning for mitigation addressing reclamation activities.

CR3-2 The BLM shall be notified prior to the demolition or substantial alteration of any building or structure. If judged necessary by the BLM, the developer will be required to evaluate the structures for their significance employing professionally qualified architects or historic architects. If structures slated for demolition are found to be eligible for listing on the NRHP, they will be recorded to Historic American Building Survey and/or Historic American Engineering Record standards before alteration or removal.

CR3-3 Project developers shall confine soil-disturbing reclamation and decommissioning activities to previously disturbed areas. Known historic properties will be avoided during these activities.

B.3.4 Other Programmatic Design Features

The BLM may require additional design features based on the following documents:

- Guidelines and Standards for Archaeological Inventory. Internet website: https://www.blm.gov/documents/noc/blm-library/cultural-resource-series/guidelines-and-standards-archaeological-inventory
- BLM Manual 8100, The Foundations for Managing Cultural Resources. Internet website: https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual8100.pdf
    - Section 8100, The Foundations for Managing Cultural Resources
    - Section 8110, Identifying and Evaluating Cultural Resources
    - Section 8120, Tribal Consultation Under Cultural Resource Authorities
    - Section 8130, Planning for Uses of Cultural Resources

- Section 8140, Protecting Cultural Resources
- Section 8150, Permitting Uses of Cultural Resources

B.3.5 Design Features for Native American Concerns

The following design features have been identified to avoid, minimize, or mitigate potential impacts in areas of Native American concern regarding solar energy development, as discussed in the Final Solar PEIS ROD (BLM 2012; Sections 5.16.1 and 5.16.2).

B.3.6 General

NA1-1 The BLM shall consult with federally recognized Indian tribes early in the planning process to identify issues and areas of concern regarding any proposed solar energy project as required by the National Historic Preservation Act (NHPA) and other authorities to determine whether construction and operation of a project is likely to disturb traditional cultural properties or sacred sites, impede access to culturally important locations, disrupt traditional cultural practices, affect movements of animals important to tribes, or visually affect culturally important landscapes.

(a) Identifying issues and areas of concern to federally recognized Indian tribes shall include, but is not limited to, the following:

Covering planning, construction, operation, and reclamation activities during consultation. Agreements or understandings reached with affected tribes shall be carried out in accordance with the terms of MOAs or State Specific Procedures as defined within the Solar PA.

- The BLM consulting with affected Indian tribes during the Section 106 process at the points specified in the Solar PA.
- The BLM consulting with Indian tribes under the terms of the Native American Graves Protection and Repatriation Act. Any planning for treatment of historic properties or mitigation will take such consultations into account.
- The BLM seeking, during consultation, to develop agreements with affected tribes on how to appropriately respond to input and concerns in advance to save time and avoid confusion.

(b) Methods to minimize issues and areas of concern to federally recognized Indian tribes may include, but are not limited to, the following:

- Employing standard noise design features for solar facilities located near sacred sites to minimize the impacts of noise on culturally significant areas.
- Employing health and safety design features for the general public for solar facilities located near Native American traditional use areas in order to minimize potential health and safety impacts on Native Americans.
- Avoiding known human burial sites. Where there is a reasonable probability of encountering undetected human remains and associated funerary objects by a solar energy project, the BLM will carry out discussions with Indian tribes before the project is authorized, in order to provide general guidance on the treatment of any cultural items (as defined by NAGPRA) that might be exposed.

- Avoiding visual intrusion on sacred sites through the selection of the solar facility location and solar technology. When complete avoidance is not practicable or economically feasible, the BLM shall engage in timely and meaningful consultation with the affected tribe(s) and shall attempt to formulate a mutually acceptable plan to mitigate or reduce the adverse effects.
- Avoiding rock art (panels of petroglyphs and/or pictographs). These panels may be just one component of a larger sacred landscape, in which avoidance of all impacts may not be possible. Mitigation plans for eliminating or reducing potential impacts on rock art shall be formulated in consultation with the appropriate tribal cultural authorities.
- Avoiding springs and other water sources that are or may be sacred or culturally important. If it is necessary for construction, maintenance, or operational activities to take place in proximity to springs or other water sources, appropriate measures, such as the use of geotextiles or silt fencing, shall be taken to prevent silt from degrading water sources. The effectiveness of these mitigating barriers shall be monitored. Measures for preventing water depletion impacts on springs shall also be employed. Particular mitigations shall be determined in consultation with the appropriate Indian tribe(s).
- Avoiding culturally important plant species. When it is not possible to avoid affecting these plant resources, consultations shall be undertaken with the affected Indian tribe(s). If the species is available elsewhere on agency-managed lands, guaranteed access may suffice. For rare or less-common species, establishing (transplanting) or propagating an equal amount of the plant resource elsewhere on agency-managed land accessible to the affected tribe may be acceptable (e.g., for mesquite groves and rice grass fields, identified as tribally important plant species in the ethnographic studies).
- Avoiding culturally important wildlife species and their habitats. When it is not possible to avoid these habitats, solar facilities shall be designed to minimize impacts on game trails, migration routes, and nesting and breeding areas of tribally important species. Mitigation and monitoring procedures shall be developed in consultation with the affected tribe(s).
- Securing a performance and reclamation bond for all solar energy generation facilities to ensure compliance with the terms and conditions of the ROW authorization. When establishing bond amounts and conditions, the BLM authorized officer shall require coverage of all expenses tied to identification, protection, and mitigation of cultural resources of concern to Indian tribes. These may include, but are not limited to, costs for ethnographic studies, inventory, testing, geomorphological studies, data recovery, curation, monitoring, treatment of damaged sites, and generation and submission of reports (see ROW authorization policies, Section 2.2.1.1 of the Final Solar PEIS).

B.3.7 Site Characterization, Siting and Design, Construction

NA2-1 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.

B.3.8 Operations and Maintenance

NA3-1 Consultation with affected federally recognized Indian tribes shall be ongoing during the life of the project.

NA3-2 The project developer shall train facility personnel regarding their responsibilities to protect any known resources of importance to federally recognized Indian tribes.

B.3.9 Other Programmatic Design Features

The BLM may require additional design features based on the following documents:

- BLM Manual 1780, Tribal Relations
- BLM Manual 8100, The Foundations for Managing Cultural Resources. Internet website: https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual8100.pdf
  - Section 8100, The Foundations for Managing Cultural Resources
  - Section 8110, Identifying and Evaluating Cultural Resources
  - Section 8120, Tribal Consultation Under Cultural Resource Authorities
  - Section 8130, Planning for Uses of Cultural Resources
  - Section 8140, Protecting Cultural Resources
  - Section 8150, Permitting Uses of Cultural Resources

B.4 Preliminary Hydrologic Resources (Water Resources) Design Features

The following design features from the Final Solar PEIS ROD (BLM 2012; Sections 5.17.1 and 5.17.2), presented by project phase, have been identified to avoid, minimize, or mitigate potential impacts on water resources from solar energy development, as identified and discussed in Sections 5.9.1 and 5.9.2 of the Final Solar PEIS ROD.

B.4.1 General

The following activities will be undertaken to minimize impacts on water resources. They are to be done in coordination with the appropriate local, state, and federal regulating agencies.

WR1-1 The project developer shall control project site drainage, erosion, and sedimentation related to stormwater runoff. The project developer shall identify site surface water runoff patterns and develop measures that prevent adverse impacts associated with project related soil deposition and erosion throughout and downslope of the project site and project-related construction areas. This shall be implemented within a Stormwater Pollution Prevention Plan and incorporated into the POD, as appropriate.

(a) Assessing stormwater runoff concerns shall include, but is not limited to, the following:

- Conducting hydrologic analysis and modeling to define the 100-year, 24-hour rainfall for the project area and calculating projected runoff from this storm at the site.
- Demonstrating the project will not increase off-site flooding potential and including provisions for stormwater and sediment retention on the project site.
- Demonstrating compliance with construction stormwater permitting through the EPA or state-run NPDES program (whichever applies within the state).
- Demonstrating compliance with the EPA requirement that any development larger than 20 acres (0.08 km^2) and begun after August 2011 must monitor construction discharges for turbidity concentrations.

(b) Methods to minimize stormwater runoff concerns may include, but are not limited to, the following:

- Managing runoff from parking lots, roofs, or other impervious surfaces.
- Creating or improving landscaping used for stormwater treatment to capture runoff.
- Considering reduction of impervious surfaces through the use of permeable pavement or other pervious surfaces.
- Maintaining natural drainages and pre-project hydrographs for the project ROW to the extent practicable.
- Maintaining pre-development flood hydrograph for all storms up to and including the 100-year rainfall event.
- Incorporating environmental inspection and monitoring measures into the POD and other applicable plans to monitor and respond to impacts from stormwater runoff during construction, operations, and decommissioning of a solar energy development, including adaptive management protocols.

WR1-2 Project developers shall conduct hydrologic study (or studies) that demonstrate a clear understanding of the local surface water and groundwater hydrology.

(a) Assessing surface water and groundwater hydrology may include, but is not limited to, the following:

- Determining the relationship of the project site hydrologic basin to the basins in the region.
- Identifying surface water bodies within the watershed of SEZs or individual projects (including rivers, streams, ephemeral washes/drainages, lakes, wetlands, playas, and floodplains) and identifying the 100-year floodplain of any surface water feature on the site.
- Identifying applicable groundwater aquifers.
- Quantifying physical characteristics of surface water features, such as streamflow rates, stream cross sections, channel routings, seasonal flow rates.
- Quantifying physical characteristics of the groundwater aquifer, such as physical dimensions of the aquifer, sediment characteristics, confined/unconfined conditions, hydraulic conductivity, and transmissivity distribution of the aquifer.
- Quantifying the regional climate, including seasonal and long-term information on temperatures, precipitation, evaporation, and evapotranspiration.
- Quantifying the sustainable yield of surface waters and groundwater available to the project.
- Consulting with the USACE regarding the siting of solar energy generating facilities in relation to hydrological features that have the potential to be subject to USACE jurisdiction.

WR1-3 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.

(a) Assessing water use shall include, but is not limited to, the following:

- Quantifying water use requirements for project construction, operations, and decommissioning.
- Meeting potable water supply standards of Federal, state, and local water quality authorities (e.g., Sections 303 and 304 of the Clean Water Act [CWA]).
- Identifying wastewater treatment measures and new or expanded facilities, if any, to be included as part of the facility's National Pollutant Discharge Elimination System (NPDES) permit.

(b) Methods for minimizing water use may include, but are not limited to, the following:

- Utilizing appropriate water sources with respect to management practices for maintaining aquatic, riparian, and other water-dependent resources.
- Considering water conservation measures related to solar energy technology water needs to reduce project water requirements (i.e., use dry cooling, use recycled or impaired water).
- Incorporating environmental inspection and monitoring measures into the POD and other applicable plans to monitor water use during construction, operations, and decommissioning of the solar energy development, including adaptive management protocols.

WR1-4 Project developers shall avoid and/or minimize impacts on existing surface water features, including streams, lakes, wetlands, floodplains, intermittent/ephemeral streams, and playas (any unavoidable impacts would be minimized or mitigated) and in nearby regions resulting from the development in accordance with the following:

All sections of the CWA, including Sections 401, 402, and 404, addressing licensing and permitting issues:

- Executive Orders (E.O.s) 11988 and 11990 of May 24, 1977, regarding floodplain and wetland management: E.O. 11988, "Floodplain Management" (*Federal Register*, Volume 42, page 26951 [42 FR 26951]), and E.O. 11990, "Protection of Wetlands" (42 FR 26961);
- EPA stormwater management guidelines and applicable state and local guidelines;
- Include submittal of a jurisdictional delineation for consultation with the USACE, in accordance with the 1987 wetlands delineation manual and appropriate regional supplement; avoidance, minimization and compensation proposals;
- USACE permit, Nationwide verification, or other approved jurisdiction. This includes identification of a Least Environmentally Damaging Practicable Alternative (LEDPA) within the environmental analysis. The USACE permit, Nationwide verification, or approved jurisdiction letter shall be provided to the BLM prior to a decision;
- National Wild and Scenic Rivers System (Public Law 90-542; 16 United States Code 1271 et seq.); and
- Required CWA Section 303(d) identification of impaired surface water bodies.

B.4.2 Site Characterization, Siting and Design, Construction

WR2-1 Project developers shall avoid, minimize, and mitigate impacts on groundwater and surface water resources in accordance with the laws and policies above.

(a) Methods to minimize impacts on surface water and groundwater resources may include, but are not limited to, the following:

- Reclaiming disturbed soils as quickly as possible.
- Preventing the release of project waste materials into stormwater discharges.
- Avoiding impacts on sole source aquifers according to EPA guidelines.
- Developing measures to prevent potential groundwater and surface water contamination and incorporating them into the Spill Prevention and Emergency Response Plan and POD, as appropriate.
- Minimizing land disturbance in ephemeral washes and dry lake beds. Stormwater facilities shall be designed to route flow through or around the facility using existing washes when feasible, instead of concrete-lined channels.
- Designing culverts and water conveyances to comply with BLM, state, and local standards, or to accommodate the runoff of a 100-year storm, whichever is larger.
- Designing stormwater retention and/or infiltration and treatment systems for storm events up to and including the 100-year storm event.
- Utilizing geotextile matting to stabilize disturbed channels and stream banks.
- Diverting worksite runoff from entering disturbed streams using earth dikes, swales, and lined ditches.
- Placing sediment control devices so that sediment-laden water can pond, thus allowing sediment to settle out.
- Considering placement of check dams (i.e., small barriers constructed of rock, gravel bags, sandbags, fiber rolls, or reusable products) across a swale or drainage ditch to reduce the velocity of flowing water.
- Considering special construction techniques in areas of erodible soil, alluvial fans, and stream channel/wash crossings.
- Backfilling foundations and trenches with originally excavated material.
- Disposing of excess excavated material according to state and Federal laws.
- Maintaining drilling fluids or cuttings in a manner so as not to contact aquatic habitats. Temporary impoundments for storing drilling fluids and cuttings shall be lined to minimize the infiltration of runoff into groundwater or surface water.
- Avoiding washing equipment or vehicles in streams and wetlands.
- Constructing entry and exit pits in work areas to trap sediments from vehicles so they do not enter streams at stream crossings.
- Providing for periodic removal of wastewater generated in association with sanitary facilities by a licensed hauler.
- Avoiding the creation of hydrologic conduits between two aquifers.

- Using herbicides and pesticides within the framework of BLM and DOI policies and standard operating procedures, to include the use of only EPA-registered pesticides/herbicides that also comply with state and local regulations.
- Transporting, storing, managing, and disposing of hazardous materials and vehicle/equipment fuels in accordance with accepted best management practices (BMPs) and in compliance with all applicable regulations, and where applicable, the SWPPP.

B.4.3 Operations and Maintenance

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.

(a) Maintaining the water resource design elements during operations and maintenance of the project shall include, but not be limited to, the following:

- Monitoring water quantity and quality in areas adjacent to or downstream from development areas through the life of the project to ensure that water flows and water quality are protected.
- Treating of sanitary and industrial wastewater either on-site or off-site to comply with Federal, state, and local regulations. Any discharges to surface waters would require NPDES permitting. Any storage or treatment of wastewater on-site must use proper lining of holding ponds and tanks to prevent leaks.
- Implementing monitoring using adaptive management strategies to ensure that long-term water use during operations does not substantially and disproportionately contribute to the long-term decline of groundwater levels or surface water flows and volumes, considering any mitigation measures that have been taken.

B.4.4 Reclamation and Decommissioning

WR4-1 Reclamation of the project site shall begin immediately after decommissioning to reduce the likelihood of water resource impacts from project activities. Developers shall coordinate with the BLM in advance of interim/final reclamation to have the BLM or other designated resource specialists on-site during reclamation to work on implementing water resource requirements and BMPs.

(a) Methods for minimizing water resource impacts associated with reclamation and decommissioning activities may include, but are not limited to, the following:

- Restoring the project area to predevelopment water conditions or to the extent acceptable to the BLM.
- Considering contouring of soil borrow areas, cut-and-fill slopes, berms, water bars, and other disturbed areas to approximate naturally occurring slopes.
- Feathering edges of vegetation to reduce form and line contrasts with the existing landscapes.
- Salvaging and reapplying topsoil from all decommissioning activities during final reclamation.
- Continuing groundwater and surface water monitoring activities for a limited period of time, if appropriate given the specific situation.

B.4.5 Other Programmatic Design Features

The BLM may require additional design features and BMPs for water resources, as listed in **Table B-3**, as applicable. How each design feature would protect the water resources and during which phases of the solar development process the design feature is typically applied is summarized below. Many of the potential design features indicate the need for project-specific plans or studies. The plans are included in **Table B-4**, Required Plans, and the studies are included in **Table B-5**, Required Studies. The content and applicability of these plans and studies would depend on specific project requirements and locations; however, some guidance is provided for what to include in specific plans and studies.

Several project applicants have prepared aquatic resource surveys, water supply assessments, and hydrology assessments. Additional hydrologic studies and groundwater basin analyses are anticipated to be conducted on a site-specific basis for each project's site-specific engineering and design.

Table B-3. Additional Programmatic Design Features and Best Management Practices for Water Resources

Description of Measure	Purpose	Applied Phases
Project applicants who plan to use groundwater would develop and implement a groundwater resource monitoring and mitigation plan, which includes monitoring the effects of groundwater withdrawal for project uses, vegetation restoration and dust-control uses during decommissioning, and aquifer recovery after project decommissioning. The monitoring frequency would be decided on a site-specific basis and in coordination with federal, state, and local agencies managing the region's groundwater resources.	Monitor and protect groundwater resources	Siting, construction, operation, and decommissioning
If groundwater use is proposed, project applicants would ensure that a comprehensive analysis of the groundwater basin is provided and that the following potential significant impacts are evaluated: • Creation or exacerbation of overdraft conditions and their potential to cause subsidence and loss of aquifer storage capacity • Use that causes injury to other water rights claims in the basin • Estimates of the total cone of depression, considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase • Changes in water quality that affect other beneficial use • Effects on groundwater-dependent ecosystems, such as springs, seeps, and wetlands that provide water for plants and animals	Monitor and protect groundwater resources	Siting

Description of Measure	Purpose	Applied Phases
Groundwater wells constructed during any stage of the project would conform to state and local standards; records should include: • Legal description (township, range, section, and quarter section) • Project map with proposed and existing well locations • Well design characteristics, including casing diameter, screened interval(s), well depth, and static water level • Results of groundwater pumping tests or other tests conducted in the well • Anticipated pumping capacity and peak pumping rates	Monitor and protect groundwater resources	Siting
Project applicants should use the minimum volume of water necessary for construction and O&M activities, such as panel washing and dust abatement. Collecting and recycling the wash water is encouraged. Water use would be minimized by implementing conservation practices, such as treating spent wash water and storing it for reuse.	Protect groundwater and surface water resources	Construction and operations
Project applicants who plan to use surface water sources should develop a water resource monitoring and mitigation plan that includes monitoring changes in flows, volumes, and water quality during construction and operations, as well as their recovery during decommissioning. The monitoring frequency would be decided on a site-specific basis and in coordination with federal, state, and local agencies managing the region's surface water resources.	Monitor and protect surface water resources	Siting
Project applicants would avoid or minimize and mitigate the degradation of water quality (for example, chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) that could result from construction activities. Water quality in areas adjacent to or downstream of development areas would be monitored during the life of the project to ensure water quality is protected.	Protect surface water resources, wetlands, and riparian areas	Construction, operations, decommissioning and reclamation
Washing equipment or vehicles in streams and wetlands would be avoided.	Protect surface water resources, wetlands, and riparian areas	Construction, operations, decommissioning and reclamation
No project or project-related activities would degrade, negatively effect, or contribute to impairment of existing surface water quality conditions for waterbodies that are federally designated on the CWA Section 303(d) list of impaired surface waters.	Ensure compliance with state water quality	Construction, operation, and decommissioning
When an herbicide or pesticide is used to control vegetation, the climate, soil type, slope, and vegetation type would be considered in determining the risk of herbicide/pesticide contamination. Additionally, an animal, pest, and vegetation control plan should be developed to ensure applications are conducted within the framework of BLM and Department of the Interior policies and standard operating procedures. The plan should entail the use of only EPA-registered pesticides and herbicides that also comply with state and local regulations.	Minimize herbicide and pesticide contamination of groundwater and surface water resources	Construction, operation, and decommissioning

Description of Measure	Purpose	Applied Phases
Projects applicants should maintain the predevelopment flood hydrograph for all storms up to and including the 100-year rainfall event. All stormwater retention, infiltration, and treatment systems should also be designed for all storms up to and including the 100-year storm event. As part of a spill prevention and emergency response plan, measures to prevent potential groundwater and surface water contamination should be identified. Hydrologic analysis and modeling should be conducted to define the 100-year, 24-hour rainfall event for the project area and calculation of projected runoff from this storm at the site.	Minimize spills from storms and floods	Siting
Applicants should coordinate with state and local regulatory agencies regarding the issuance of permits or "will-serve" agreements for development and use of water, and/or the operation of on-site wastewater treatment systems.	Ensure wastewater treatment	Siting and operations
The facility should obtain and comply with a construction stormwater permit through the EPA or State-run NPDES program.[4] Additionally, the EPA requires any development larger than 20 acres begun after August 2011 to comply with a requirement to monitor construction discharges for turbidity concentrations.	Obtain stormwater treatment permit	Siting, construction, operation, and decommissioning
Construction activities would avoid land disturbance in ephemeral washes and dry lake beds; any unavoidable disturbance would be minimized. Stormwater facilities would be designed to route flow around the facility and to maintain pre-project hydrographs.	Minimize impacts from stormwater	Construction, operations, decommissioning and reclamation
When stream or wash crossings are constructed, culverts or water conveyances for temporary and permanent roads would be designed to comply with county standards or to accommodate the runoff of a 100-year storm, whichever is larger.	Minimize impacts from stormwater	Construction, operations, decommissioning and reclamation
Geotextile mats would be used to stabilize disturbed channels and stream banks. Earth dikes, swales, and lined ditches would be used to divert worksite runoff that would otherwise enter a disturbed stream.	Minimize impacts from stormwater	Construction, operations, decommissioning and reclamation
Special construction techniques would be used, where applicable, in areas of erodible soil, alluvial fans, and stream channel and wash crossings.	Minimize impacts from stormwater	Construction, operations, decommissioning and reclamation
Project applicants would compensate for the loss of ephemeral drainage habitat through in-kind habitat restoration of a portion of the main drainage at a minimum ratio of 2:1. Restoration components could include removing accumulated sediment, bank stabilization, planting of vegetation, sediment-control measures, establishing protective habitat buffers, placing a conservation easement over the restored drainage and buffer, and funding an endowment that would provide for long-term management.	Mitigate impacts to wetland and ephemeral surface waters	Construction

[4] Nevada has a State-run NPDES program. For facilities that discharge to surface waters, the NDEP uses the federal NPDES Discharge Permit Program forms and requirements.

Description of Measure	Purpose	Applied Phases
All management plans, mitigation measures, and stipulations developed for the construction phase would be applied to similar activities during the decommissioning/reclamation phase.	Reclamation	Decommissioning and reclamation

Source: BLM 2012; Iosso 2023; NDEP 2023

Table B-4. Required Plans

Plan	Description
Drainage, erosion, and sedimentation control plan	A drainage, erosion, and sedimentation control plan would be developed that ensures protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for stormwater and sediment retention on the project site. The plan would identify site surface water runoff patterns and develop mitigation measures that prevent excessive and unnatural soil deposition and erosion throughout and downslope of the project site and project-related construction areas. The plan would achieve the following: • Runoff from parking lots, roofs, or other impervious surfaces would be directed to the immediate landscape or to retention basins prior to being released downgradient of the site. • Any landscaping used for stormwater treatment would require little or no irrigation and would be recessed to create retention basins/areas used to capture runoff. • The amount of area covered by impervious surfaces would be reduced through the use of permeable pavement or other pervious surfaces. • Natural drainages and a pre-project hydrograph would be maintained for the area. Siting in identified 100-year floodplains would not be allowed within the development.

Plan	Description
Spill prevention and emergency response plan	As part of a spill prevention and emergency response plan, measures to prevent potential groundwater and surface water contamination would be identified. The spill prevention and emergency response plan would identify sources, locations, and quantities of potential chemical releases (through spills, leaks, or fires) and define response measures. Notification requirements would be developed and followed to reduce the potential for soil contamination. The plan would also identify individuals and their responsibilities for implementing the plan. A plan would be developed that considers sensitive ecological resources. Spills of any toxic substances would be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats due to runoff or leaching. For the facility, a comprehensive spill prevention and emergency response plan would be developed that meets the following criteria: it is written, periodically updated, and made available to the entire workforce; it contains procedures for timely notification of appropriate authorities, including the designated BLM land manager; it provides spill and emergency contingency planning for each type of hazardous material present, including abatement or stabilizing of the release, recovery of spilled product, and remediation of impacted environmental media; it is supported by the strategic deployment of appropriate spill response materials and equipment, including personal protective equipment (PPE) for individuals with spill or emergency response assignments; it provides for prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; it formally assigns spill and emergency response duties to specified individuals; it provides and documents appropriate training to individuals with spill or emergency response assignments; it provides general awareness training to remaining facility personnel; and it provides for written documentation of each event, including a root cause analysis, corrective actions taken, and a characterization of the resulting environmental or health and safety impacts.
Stormwater management plan	A stormwater management plan would be developed for the site to ensure compliance with applicable regulations and to prevent off-site migration of contaminated stormwater, changes in pre-project storm hydrographs, or increased soil erosion. Siting in identified 100-year floodplains would not be allowed within the development. Projects applicants would maintain the predevelopment flood hydrograph for all storms up to and including the 100-year rainfall event. All stormwater retention and/or infiltration and treatment systems would also be designed for all storms up to and including the 100-year storm event.

Plan	Description
Water resources monitoring and mitigation plan	Project applicants who plan to use groundwater would develop and implement a water resources monitoring and mitigation plan, which includes: • Monitoring the effects of groundwater withdrawal for project uses, vegetation restoration and dust-control uses during decommissioning, and aquifer recovery after project decommissioning • Monitoring changes in flows, volumes, and water quality during construction and operations, as well as their recovery during decommissioning • Monitoring frequency that would be decided on a site-specific basis and in coordination with federal, state, and local agencies managing surface water resources of the region • Groundwater and surface water monitoring activities that would be as outlined in the established groundwater monitoring plan for the site A water resources monitoring and mitigation plan would be developed for each project in consultation with local and state agencies. Changes in surface water or groundwater quality (for example, chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including alterations of cover and community structure, species composition, and diversity) off the project site would be avoided to the extent practicable. A monitoring plan would be developed that determines the effects of groundwater withdrawals on plant communities. See measures applicable to protecting water quality.

Table B-5. Required Studies

Study	Description
Preliminary hydrologic study	Project applicants would conduct a preliminary hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. At a minimum, this hydrologic study would include: • The relationship of the project site hydrologic basin to the basins in the region • Identification of all surface waterbodies, including rivers, streams, ephemeral washes/drainages, lakes, wetlands, playas, and floodplains • Identification of all applicable groundwater aquifers • Preliminary estimates of physical characteristics of surface water features, groundwater aquifers, and the regional climate (seasonal and long term)

Study	Description
Detailed hydrologic study	Applicants would be required to conduct a detailed hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. At a minimum, this hydrologic study would include: • Quantification of physical characteristics describing surface water features, such as streamflow rates, stream cross sections, channel routings, seasonal flow rates (intermittent streams), peak flow rates (ephemeral washes/drainages), sediment characteristics and transport rates, lake depths, and surface areas of lakes, wetlands, and floodplains • Hydrologic analysis and modeling to define the 100-year, 24-hour rainfall event for the project area and calculation of projected runoff from this storm at the site • Hydrologic analysis and modeling to identify 100-year floodplain boundaries of any surface water feature on the site • Quantification of physical characteristics describing the groundwater aquifer, such as physical dimensions of the aquifer, sediment characteristics, confined/unconfined conditions, hydraulic conductivity and transmissivity distribution of the aquifer, groundwater surface elevations, and groundwater flow processes (direction, recharge/discharge, current basin extractions, and surface water-groundwater connectivity) • Quantification of the regional climate, including seasonal and long-term information on temperatures, precipitation, evaporation, and evapotranspiration • Quantification of the sustainable yield of surface waters and groundwater available to the project. Project applicants would evaluate the water sources in terms of existing water rights and management plans for adequacy to serve project demands while maintaining aquatic, riparian, and other water-dependent resources.
Comprehensive groundwater basin analysis	If groundwater use is proposed, project applicants would ensure that a comprehensive analysis of the groundwater basin is provided and that the following potential significant impacts are evaluated: • Creation or exacerbation of overdraft conditions and their potential to cause subsidence and loss of aquifer storage capacity.

B.5 Preliminary Geology and Minerals (Mineral Resources) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.2.1 and 5.2.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on mineral resources from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.5.1 General

MR1-1 Project developers shall consult with the BLM in the early phases of project planning to identify potential impacts on mineral development activities and ways to minimize potential adverse impacts.

(a) Assessing impacts on mineral resources shall include, but is not limited to, the following:

- Identifying active mining claims or mineral development activities and potential for mineral development in proximity to a proposed project. In coordination with the BLM, developers shall consult existing land use plans and updated inventories.
- Evaluating impacts on mineral development as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

MR1-2 All solar energy development ROWs shall contain the stipulation that the BLM retains the right to issue oil and gas or geothermal leases with a stipulation of no surface occupancy within the ROW area. Upon designation, SEZs will be classified as no surface occupancy areas for oil and gas and geothermal leasing.

B.5.2 Reclamation and Decommissioning

NA4-1 The project developer shall confine reclamation and decommissioning activities to previously disturbed areas and existing access roads to the extent practicable.

NA4-2 The project developer shall return the site to its pre-construction condition, to the extent practicable and approved by the BLM.

B.5.3 Site Characterization, Siting and Design, Construction

MR2-1 Solar energy development projects shall be located to minimize conflicts with valid existing mineral rights, their corner and boundary markers, and/or ongoing mineral development.

B.6 Preliminary Lands, Realty – Land Use Authorizations Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.2.1 and 5.2.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on lands and realty from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.6.1 General

LR1-1 Project developers shall consult with the BLM in the early phases of project planning to identify potential land use conflicts and constraints.

(a) Identification of potential land use conflicts shall include, but is not limited to, the following:

- Identify and mark valid mining claims corner markers in accordance with H-9600-1, Cadastral Survey Handbook, Chapter 1, section 2, "Standard Stipulation - Protection of Survey Corner and Boundary Line Markers.
- Identifying potential land use conflicts in proximity to the proposed project. In coordination with the BLM, developers shall consult existing BLM land use plans and local land use plans, as well as with appropriate Federal, state, and local agencies; affected tribes; and adjacent property owners.
- Identifying legal access to private, state, and Federal lands surrounding the solar facilities and the potential to create areas that are inaccessible to the public.
- Considering the effects on the manageability and uses of public lands around boundaries of solar energy facilities.
- Considering the potential effects on prime and unique farmland.
- Evaluating land use impacts and constraints as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.
- Providing notification to existing BLM ROW authorization holders within solar energy development areas, pursuant to Title 43, Part 2807.14 of the *Code of Federal Regulations* (43 CFR

2807.14), to inform them that an application that might affect their existing ROW has been filed and request their comments.

- Proposed solar energy developments within one-quarter mile of any section line, boundary line or project boundary will require issuance of a SBE Land Surveyor Report (LSR) in conformance with Departmental and BLM standards. In some cases, Boundary Certificates of Inspection and Possession (Boundary CIP), Boundary Assurance Certificates (BAC), resurveys, remonumentation, and/or referencing of PLSS and Mineral Survey corners may be required before the start of any action.

(b) Methods to minimize land use conflicts and constraints may include, but are not limited to, the following:

- Informing project personnel of all laws and regulations that they may be subject to, such as international borders, limitations on the removal of salable materials such as stone or wood from a project site for personal use, and use of vehicles off of the project site in limited access areas. This information should be incorporated into a Worker Education and Awareness Plan (WEAP) that is provided to all project personnel prior to entering the project worksite. The WEAP shall be provided on a regular basis, covering multiple resources, to ensure the awareness of key mitigation efforts of the project worksite during all phases of the project's life. The base information the WEAP provides shall be reviewed and approved by the BLM prior to the issuance of a Notice to Proceed and incorporate adaptive management protocols for addressing changes over the life of the project, should they occur.

B.6.2 Site Characterization, Siting and Design, Construction

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

(a) Methods to minimize impacts on BLM land use planning designations may include, but are not limited to, the following:

- Locating existing designated transmission corridors within the area of a proposed solar energy development project in consultation with the BLM. Reviewing future transmission capacity in the corridor to determine whether the corridor should be excluded from solar energy development or whether the capacity of the designated transmission corridor can be reduced. Options to partially relocate the corridor to retain the current planned capacity or to relocate the solar energy project outside the designated corridor may be considered.
- Identifying and protecting evidence of the PLSS and related Federal property boundaries prior to commencement of any ground-disturbing activity. This will be accomplished by contacting the BLM Cadastral Survey to coordinate data.

B.7 Preliminary Lands with Wilderness Characteristics (Specially Designated Areas and Lands with Wilderness Characteristics) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.3.1 and 5.3.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on specially designated areas and lands with wilderness characteristics from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.7.1 General

LWC1-1 Protection of existing values of specially designated areas and lands with wilderness characteristics shall be evaluated during the environmental analysis for solar energy projects, and the results shall be incorporated into the project planning and design.

(a) Assessing potential impacts on specially designated areas and lands with wilderness characteristics shall include, but is not limited to, the following:

- Identifying specially designated areas and lands with wilderness characteristics in proximity to the proposed projects. In coordination with the BLM, developers shall consult existing land use plans and updated inventories.
- Identifying lands that are within the geographic scope of a proposed solar energy project that have not been recently inventoried for wilderness characteristics or any lands that have been identified in a citizen's wilderness proposal in order to determine whether they possess wilderness characteristics. Developers shall consider including the wilderness characteristics evaluation as part of the processing of a solar energy ROW application for those lands without a recent wilderness characteristics inventory. All work must be completed in accordance with current BLM policies and procedures.
- Evaluating impacts on specially designated areas and lands with wilderness characteristics as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

(b) Methods to mitigate unavoidable impacts on specially designated areas and lands with wilderness characteristics may include, but are not limited to, the following:

- Acquiring wilderness inholdings from willing sellers.
- Acquiring private lands from willing sellers adjacent to designated wilderness.
- Acquiring private lands from willing sellers within proposed wilderness or Wilderness Study Areas.
- Acquiring other lands containing important wilderness or related values, such as opportunities for solitude or a primitive, unconfined (type of) recreation.
- Restoring wilderness, for example, modifying routes or other structures that detract from wilderness character.
- Contributing mitigation monies to a "wilderness mitigation bank," if one exists, to fund activities such as the ones described above.
- Enacting management to protect lands with wilderness characteristics in the same field office or region that are not currently being managed to protect wilderness character. Areas that are to be

managed to protect wilderness characteristics under this approach must be of sufficient size to be manageable, which could also include areas adjacent to current WSAs or adjacent to areas currently being managed to protect wilderness characteristics.

- Preparing Special Designated Area MLB Plans or Lands with Wilderness Characteristics MLB Plans as part of the options to avoid, minimize and/or mitigate adverse impacts in coordination with BLM Cadastral Survey.

B.7.2 Site Characterization, Siting and Design, Construction

LWC2-1 Solar facilities shall be sited, designed, and constructed to avoid, minimize, and/or mitigate impacts on the values of specially designated areas and lands with wilderness characteristics.

B.8 Preliminary Native American Concerns Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.16.1 and 5.16.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on Native American concerns from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.8.1 General

NA1-1 The BLM shall consult with federally recognized Indian tribes early in the planning process to identify issues and areas of concern regarding any proposed solar energy project as required by the National Historic Preservation Act (NHPA) and other authorities to determine whether construction and operation of a project is likely to disturb traditional cultural properties or sacred sites, impede access to culturally important locations, disrupt traditional cultural practices, affect movements of animals important to tribes, or visually affect culturally important landscapes.

(a) Identifying issues and areas of concern to federally recognized Indian tribes shall include, but is not limited to, the following:

- Covering planning, construction, operation, and reclamation activities during consultation. Agreements or understandings reached with affected tribes shall be carried out in accordance with the terms of MOAs or State Specific Procedures as defined within the Solar PA.
- The BLM consulting with affected Indian tribes during the Section 106 process at the points specified in the Solar PA.
- The BLM consulting with Indian tribes under the terms of the Native American Graves Protection and Repatriation Act. Any planning for treatment of historic properties or mitigation will take such consultations into account.
- The BLM seeking, during consultation, to develop agreements with affected tribes on how to appropriately respond to input and concerns in advance to save time and avoid confusion.

(b) Methods to minimize issues and areas of concern to federally recognized Indian tribes may include, but are not limited to, the following:

- Employing standard noise design features for solar facilities located near sacred sites to minimize the impacts of noise on culturally significant areas.

B.9 Preliminary Noise Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.13.1 and 5.13.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on noise from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.9.1 General

N1-1 Project developers shall consult with the BLM in the early phases of project planning to assess and minimize the proposed project's noise impacts on sensitive noise receptors.

(a) Assessing noise impacts shall include, but is not limited to, the following:

- Taking measurements to assess the existing background ambient sound levels both within and outside the project site and comparing these with the anticipated noise levels proposed at the facility. The ambient measurement protocols of all affected land management agencies shall be considered and utilized. Nearby residences and likely sensitive human and wildlife receptor locations shall be identified.
- Conducting assessments for noise impacts by qualified individuals using appropriate and commonly accepted software, procedures, and past project examples.
- Evaluating impacts from noise as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

B.9.2 Site Characterization, Siting and Design, Construction

N2-1 The siting and design of solar facilities, structures, roads, and other project elements shall seek to minimize impacts on sensitive noise receptors.

(a) Methods to minimize project impacts on sensitive noise receptors may include, but are not limited to, the following:

- Enclosing noisy equipment when located near sensitive receptors.

B.10 Preliminary Paleontological Resources Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.14.1 and 5.14.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on paleontological resources from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.10.1 General

P1-1 Project developers shall coordinate with the BLM early in the project planning process to identify and minimize impacts on paleontological resources.

(a) Identifying paleontological resources shall include, but is not limited to, the following:

- Determining in coordination with the BLM whether paleontological resources exist in a project area.

- Determining the potential presence of paleontological resources on the basis of the following: the sedimentary context of the area and its potential to contain paleontological resources (potential fossil yield classification [PFYC] class, if it is available); a records search of published and unpublished literature for past paleontological finds in the area; coordination with paleontological researchers working locally in potentially affected geographic areas and geologic strata; and/or depending on the extent of existing information, the completion of a paleontological survey.

(b) Methods to minimize impacts on paleontological resources may include, but are not limited to, the following:

- Instituting BMPs, such as training/education programs (see WEAP bullet below), to reduce the amount of inadvertent destruction to paleontological sites. Project-specific management practices shall be established in coordination with the BLM, incorporating BLM IM 2009-011.
- Planning for management and mitigation of paleontological resources of the project area for areas of known presence or high potential of presence.

B.11 Preliminary Rangeland – Grazing Management (Rangeland Resources) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.4.1.1 and 5.4.1.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on rangeland resources from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.11.1 General

RG1-1 Project developers shall consult with the BLM early in project planning to identify activities that could impact rangeland resources and grazing.

(a) Identifying impacts on rangeland resources and grazing shall include, but is not limited to, the following:

- Identifying rangeland resources and grazing use in proximity to the proposed projects. In coordination with the BLM, developers shall consult existing land use plans and updated inventories.
- Coordinating with affected grazing permittees/lessees to discuss how a proposed project may affect grazing operations and to address possible alternatives to avoid and minimize impacts, as well as mitigation and compensation strategies.
- Evaluating impacts on rangeland resources and grazing use as part of the environmental impact analysis for the project, and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM. Issues to be considered include, but are not limited to, maintenance or relocation of range improvements and fencing, access to water and water rights, delineation of open range, and traffic management.

B.11.2 Site Characterization, Siting and Design, Construction

RG2-1 Roads shall be constructed, improved, and maintained to minimize their impact on grazing operations. Road design shall include fencing, cattle guards, and speed control and information signs where appropriate.

B.12 Preliminary Recreation (Public Access and Recreation) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.5.1 and 5.5.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on public access and recreation from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.12.1 General

R1-1 Project developers shall consult with the BLM in the early phases of project planning to identify public access and recreation use areas in and adjacent to a project site.

(a) Identifying public access and recreation in and adjacent to a project shall include, but is not limited to, the following:

- Considering existing public access through or around proposed solar facilities that allows for access to and use of BLM-administered public lands and non-BLM administered lands. Developers shall conduct this assessment in coordination with the BLM and consult existing land use plans, recreation management plans, etc.
- Identifying legal access to private, state, and Federal lands surrounding the solar facilities to avoid creating areas that are inaccessible to the public.
- Evaluating impacts on public access and recreation as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

(b) Methods to minimize access and recreation conflicts may include, but are not limited to, the following:

- Considering replacement of acreage lost for identified recreation opportunities, such as off-highway vehicle use.
- Considering, to the extent practicable, providing access through or around a solar energy facility to provide for adequate public access and/or recreation.
- Incorporating environmental inspection and monitoring measures into the POD and other applicable plans to monitor and respond to impacts on recreation during construction, operations, and decommissioning of a solar energy development, including adaptive management protocols.

B.12.2 Site Characterization, Siting and Design, Construction

R2-1 Solar facilities shall not be sited in areas designated as unique or important recreation resources (such as Special Recreation Management Areas), where it has been determined that a solar facility or other such development of the land would be in direct conflict with the objectives of the relevant management plan.

B.13 Preliminary Social Values and Economic Conditions and Environmental Justice (Socioeconomics and Environmental Justice) Design Features

The following design features from the Final Solar PEIS ROD (BLM 2012; Sections 5.17.1 and 5.17.2), presented by project phase, have been identified to avoid, minimize, or mitigate potential impacts on social values and economic conditions from solar energy development.

B.13.1 General

S1-1 Project developers shall coordinate with the BLM and other Federal, state, and local agencies to identify and minimize potential socioeconomic impacts.

(a) Methods to minimize socioeconomic impacts may include, but are not limited to, the following:

- Developing a community monitoring program that would be sufficient to identify and evaluate socioeconomic impacts resulting from solar energy development. Measures developed for monitoring may include the collection of data reflecting the economic, fiscal, and social impacts of development at the state, local, and tribal level.
- Developing community outreach programs that would help communities adjust to changes triggered by solar energy development.
- Establishing vocational training programs for the local workforce to promote development of skills required by the solar energy industry.
- Preparing a Workforce Housing and Transportation Plan to anticipate housing needs for transient workers and identify options to reduce potential future project adverse effects on housing availability.
- Developing instructional materials for use in area schools to educate the local communities on the solar energy industry.
- Supporting community health screenings.
- Providing financial support to local libraries for the development of information repositories on solar energy, including materials on the hazards and benefits of commercial development. Electronic repositories established by the project developer could also be of great value.

B.13.2 Other Programmatic Design Features

The BLM may require additional measures, including compensatory and operational mitigation. Compensatory mitigation would be determined in consultation with the BLM during the project-specific environmental analysis.

B.13.3 Environmental Justice

The following design features from the Final Solar PEIS ROD (BLM 2012; Sections 5.18.1 and 5.18.2), presented by project phase, have been identified to avoid, minimize, or mitigate potential EJ impacts from solar energy development.

B.13.4 General

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.

(a) Methods to minimize environmental justice impacts may include, but are not limited to, the following:

- 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. Including key information such as any likely impact on air quality, drinking water supplies, subsistence resources, public services, and the relevant preventative/minimization measures that may be taken.

- Providing community health screenings for low-income and minority groups.
- Providing financial support to local libraries in low-income and minority communities for the development of information repositories on solar energy, including materials on the hazards and benefits of commercial development.
- Establishing vocational training programs for the local low-income and minority workforce to promote development of skills for the solar energy industry.
- Developing instructional materials for use in area schools to educate the local communities on the solar energy industry.
- Providing key information to local governments and directly to low-income and minority populations on the scale and timeline of expected solar energy projects and on the experience of other low-income and minority communities that have followed the same energy development path.
- Considering making available information about planning activities that may be initiated to provide local infrastructure, public services, education, and housing.

B.13.5 Other Programmatic Design Features

The BLM may require additional measures, including compensatory and operational mitigation. Compensatory mitigation would be determined in consultation with the BLM during the project-specific environmental analysis. In addition, tribal governments have a special status under federal law. The BLM will continue to consult with federally recognized tribes on a government-to-government basis.

B.14 Preliminary Soils (Soil Resources and Geologic Hazards) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.7.1 and 5.7.2 (soil impacts) and 5.7.3 (geologic hazards)), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on soil resources and geologic hazards from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.14.1 General

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.

(a) Assessing soil erosion and geologic hazard concerns shall include, but is not limited to, the following:

- Identifying soil erosion and geologic hazard concerns on-site and in proximity to the proposed projects. In coordination with the BLM, developers shall consult existing land use plans, updated inventories, soil surveys, etc.
- Identifying local factors that can cause slope instability (e.g., groundwater conditions, precipitation, earthquake activity, slope angles, and the dip angles of geologic strata).
- Consulting with local Federal, state, and county agencies regarding road design on the basis of local meteorological conditions, soil moisture, and erosion potential.
- Determining the potential safety and resource impacts associated with soil erosion.

- Evaluating soil erosion and geologic hazard concerns as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

B.14.2 Site Characterization, Siting and Design, Construction

SR2-1 Solar facilities shall be sited, designed, and constructed to minimize soil erosion and geologic hazard concerns.

(a) Methods to minimize soil erosion may include, but are not limited to, the following:

- Designing structures to meet the requirements of all applicable Federal, state, and county permits and building codes.
- Minimizing ground-disturbing activities.
- Preventing channel erosion from project runoff.
- Controlling culvert outlets with appropriate structures (e.g., rock lining or apron) to reduce soil erosion and scouring.
- Recontouring and revegetating project roads that are no longer needed in order to increase infiltration and reduce soil compaction.
- Considering utilizing originally excavated materials for backfill.
- Controlling project vehicle and equipment speeds to reduce dust erosion.
- Controlling water runoff and directing it to settling or rapid infiltration basins.
- Retaining sediment-laden waters from disturbed, active areas within the project through the use of barriers and sedimentation devices (e.g., berms, straw bales, sandbags, jute netting, or silt fences). Removing sediment from barriers and sedimentation devices to restore sediment-control capacity.
- Placing barriers and sedimentation devices around drainages and wetlands.
- Siting project structures and facilities to avoid disturbance in areas with existing biological soil crusts.
- Replanting project areas with native vegetation at spaced intervals to break up areas of exposed soil and reduce soil loss through wind erosion.
- Minimizing land disturbance (including crossings) in natural drainage systems and groundwater recharge zones (i.e., ephemeral washes and dry lake beds).
- Locating and constructing drainage crossing structures so as not to decrease channel stability or increase water volume or velocity.
- Providing adequate space (i.e., setbacks) between solar facilities and natural washes to preserve hydrologic function.
- Considering the use of existing roads, disturbance areas, and borrow pits before creating new infrastructure. The use of any existing infrastructure shall be analyzed in the environmental analysis for the proposed project.
- Siting, designing, and constructing new roads and walking trails consistent with the appropriate design standards and criteria, such as those described in BLM Manual 9113 and 43 CFR 8342.1. Roads and trails should follow natural land contours, and hill cuts should be minimized in the project area.

- Avoiding areas with unstable slopes and soils.
- Avoiding excessive grades on roads, road embankments, ditches, and drainages during site preparation and construction.
- Considering use of special construction techniques in areas of steep slopes, erodible soil, and drainageways.
- Considering implementing construction in stages to limit the areas of exposed and unstabilized soils.
- Reducing construction activity timeframes so that ground-disturbing activities take place over as short a timeframe as possible.
- Lessening fugitive dust emissions and site soils compaction by avoiding unpaved surfaces with construction traffic.
- Avoiding clearing and disturbing areas outside the construction zone.
- Clearly identifying construction zone boundaries on the ground (e.g., through the use of construction fencing) to minimize conflict with other resource concerns.
- Avoiding ground disturbance in areas with intact biological soil crusts and desert pavement.
- Burying electrical lines from solar collectors along existing features (e.g., roads or other paths of disturbance) to minimize the overall area of surface disturbance.
- Obtaining borrow materials from authorized and permitted sites.
- Conducting construction grading in compliance with industry practice (e.g., the American Society for Testing and Materials [ASTM] international standard methods) and other requirements (e.g., BLM and/or local grading and construction permits).
- Using temporary stabilization devices (i.e., erosion matting blankets, or soil stabilizing agents) for areas that are not actively under construction.
- Salvaging topsoil from all excavation and construction and reapplying it to disturbed areas upon completion of construction.
- Restoring native plant communities as quickly as possible in disturbed areas through natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of BLM recommendations.
- Minimizing soil-disturbing activities on wet soils.
- Performing studies to determine the effects from construction activities on the eolian processes that maintain any nearby sand dunes, if applicable.
- Incorporating environmental inspection and monitoring measures into the POD and other applicable plans to monitor and respond to impacts on soil resources during construction, operations, and decommissioning of a solar energy development, including adaptive management protocols.

(b) Methods to minimize geologic hazard concerns may include, but are not limited to, the following:

- Building project structures in accordance with the design-basis recommendations in the project-specific geotechnical investigation report.
- Considering special siting, design, and engineering strategies in areas that involve high seismic activity or have potential for flooding or debris flow.

B.14.3 Operations and Maintenance

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.

(a) Methods to maintain the soil erosion and geologic hazard design elements during operations and maintenance of the project shall include, but are not limited to, the following:

- Applying design features developed for the construction phase to similar activities during the operations phase.
- Performing routine site inspections to assess the effectiveness of maintenance requirements for erosion and sediment control systems.
- Maintaining permanent barriers and sedimentation devices to ensure effective control.
- Regularly maintaining catch basins, roadway ditches, and culverts.
- Identifying soil erosion and geologic hazard requirements within the POD and other applicable plans.

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.

B.14.4 Reclamation and Decommissioning

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.

B.15 Preliminary Transportation, Access, and Public Safety (Transportation Impacts and Health and Safety) Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.19.1 and 5.19.2, presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on transportation from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.15.1 Site Characterization, Siting and Design, Construction

T2-1 Project developers shall coordinate with the BLM and other Federal, state, and local agencies to identify and minimize impacts on transportation.

(a) Identifying impacts on transportation shall include, but is not limited to, the following:

- Assessing the potential for transportation impacts associated with the proposed project in coordination with the BLM and other appropriate state and local agencies. Consulting land use plans, transportation plans, and local plans as necessary. The developer may be required to perform traffic studies, analyses, or other studies of the capacity of existing and proposed new roads to physically handle the added wear and tear from increased construction commuter and truck traffic.

- Evaluating transportation impacts as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate such risk in coordination with the BLM.

(b) Methods to minimize impacts on transportation may include, but are not limited to, the following:

- Incorporating site access into the local and regional road network. Incorporation must be done under the supervision of the pertinent local, county, state, and Federal agencies.
- Considering public roadway corridors through a site to maintain proper traffic flows and retain more direct routing for the local population.
- Considering implementing local road improvements, providing multiple site access locations and routes, staggering work schedules, and implementing a ride-sharing or shuttle program to minimize daily commutes of construction workers.
- 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.
- Incorporating environmental inspection and monitoring measures into the POD and other relevant plans to monitor and respond to transportation impacts during construction, operations, and decommissioning of a solar energy development, including adaptive management protocols.

B.15.2 Health and Safety Design Features

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.21.1 and 5.22.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on health and safety from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.15.3 General

HS1-1 Project developers shall coordinate with the BLM and other Federal, state, and local agencies early in the planning process to identify project health and safety risks and methods to minimize those risks.

(a) Assessing project health and safety risks shall include, but is not limited to, the following:

- Identifying and establishing Federal and state occupational health and safety standards, such as the Occupational Health and Safety Administration's (OSHA's) Occupational Health and Safety Standards, 29 CFR Parts 1910 and 1926, respectively, for all phases of the project.
- Identifying safety zones or setbacks for solar facilities and associated transmission lines from residences and occupied buildings, roads, ROWs, and other public access areas that are sufficient to prevent accidents resulting from various hazards during all phases of development.

(b) Methods to minimize project health and safety risks may include, but are not limited to, the following:

- Identifying and accounting for general project injury prevention within the POD and the Health and Safety Plan, such as established PPE requirements, respiratory protection, hearing conservation measures, electrical safety considerations, hazardous materials safety and communication, housekeeping and waste handling, confined space identification, and rescue response and emergency medical support, including on-site first-aid capability.
- Implementing training and awareness measures for workers and the general public to minimize and address standard practices (such as OSHA's) for the safe use of explosives and blasting agents; occupational electric and magnetic field (EMF) exposures; fire safety and evacuation procedures; and safety performance standards (e.g., electrical system standards and lighting protection standards). Consider further training for additional health and safety risks from the solar energy project and its ancillary facilities.
- Establishing measures to document training activities and reporting of serious accidents to appropriate agencies.
- Assessing cancer and noncancer risks to workers and the general public from exposure to facility emission sources that exceed threshold levels.
- Considering implementation of measures to reduce site emissions and the cancer and noncancer from exposure to facility emissions.
- Implementing a reporting structure for accidental release of hazardous substances to the environment where project developers shall document the event, including a root cause analysis, a description of appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the permitting agencies and other Federal and state agencies within 30 days.
- Considering manufacturer requirements, and Federal and state standards, when establishing safety zones or setbacks for solar facilities and associated transmission lines.
- Project developers coordinating with the BLM and appropriate agencies (e.g., the Department of Energy and Transportation Security Administration) to address critical infrastructure and key resource vulnerabilities at solar facilities in order to minimize and plan for potential risks from natural events, sabotage, and terrorism.

B.15.4 Site Characterization, Siting and Design, Construction

HS1-1 Solar facilities shall be characterized, sited and designed, and constructed to minimize risk to health and safety.

(a) Methods to minimize risk to health and safety may include, but are not limited to, the following:

- Designing electrical systems to meet all applicable safety standards (e.g., National Electrical Code) and to comply with the interconnection requirements of the transmission system operator.
- Complying with applicable FAA regulations, including lighting requirements, to avoid or minimize potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.

- Considering temporary fencing and other measures for staging areas, storage yards, and excavations during construction or decommissioning activities to limit public access to health and safety risks.
- Planning for traffic management of site access to ensure that traffic flow would not be unnecessarily affected and that specific issues of concern (e.g., the locations of school bus routes and stops) are identified and addressed. Planning may include measures such as informational signs and temporary lane configurations. Planning shall be coordinated with local planning authorities.
- Considering use of alternative dielectric fluids that do not contain sulfur hexafluoride (SF6) to reduce the global warming potential.
- Considering measures to reduce occupational EMF exposures, such as backing electrical generators with iron to block the EMF, shutting down generators when work is being done near them, and otherwise limiting exposure time and proximity while generators are running.
- Incorporating recommendations for addressing adverse impacts on nearby residents and motorists on SR 265 from noise, sun reflection, flicker or electromagnetic fields into the project design.

B.15.5 Operations and Maintenance

HS3-1 Compliance with the terms and conditions for health and safety 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.

B.16 PRELIMINARY VISUAL RESOURCES, INCLUDING NIGHT SKIES DESIGN FEATURES

The following design features from the Solar PEIS ROD (BLM 2012; Sections 5.17.1 and 5.17.2), presented by project phase, have been identified to avoid, minimize, and mitigate potential impacts on visual resources from solar energy development. As described in the Solar PEIS ROD, programmatic design features would be required for all utility-scale solar energy projects on BLM-administered lands. Due to site-specific circumstances, not all design features, as written, would apply to all projects (for example, if a resource is not present on a given site). Some design features may require variations from what is described (for example, a larger or smaller protective area). In some cases, multiple options for addressing a potential resource conflict are provided.

B.16.1 General

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 redesign.

(a) Assessing conformance VRM class designations and identifying visual resource conflicts include, but is not limited to, the following:

- Consulting with the appropriate BLM field office for VRM class designations and associated management objectives during the early phases of project planning, including those related to project site selection, planning, and design. The BLM visual resource inventory (VRI) class values—including those for scenic quality, sensitivity, and distance zones—shall also be factored into the project planning, design, and decision-making.

- Analyzing how the visual values influence project design and how the impacts on these values will be minimized through consideration for the proposed project location and its relationship to the surrounding viewshed.
- Including a qualified professional, such as a landscape architect, with demonstrated experience of the BLM's VRM policies and procedures as part of the developer's and the BLM's respective planning teams, to evaluate visual resource issues as project siting options are considered.
- Consulting with the locally based public to provide input on identifying important visual resources in the project area and on the siting and design process. The public shall be involved and informed about the visual site design elements of the proposed solar energy facilities.
- Consulting on viewshed protection objectives and practices with the respective land management for landscapes having special designations, such as Wilderness Areas, National Scenic and Historic Trails, Wild and Scenic Rivers, National Parks, and National Wildlife Refuges located within the project's viewshed. Developers shall demonstrate a concerted effort to reconcile conflicts while recognizing that the BLM retains authority for final decisions determining project approval and conditions.
- For applications that include artifacts and remnants of a National Historic Trail, are located within the viewshed of a National Historic Trail's designated centerline, or include or are within the viewshed of a trail eligible for listing on the NRHP by virtue of its important historical or cultural values and integrity of setting, evaluating the potential visual impacts on the trail associated with the proposed project; avoiding, minimizing, and/or mitigating adverse effects through the Section 106 consultation process; and identifying appropriate mitigation measures for inclusion as stipulations in the POD.
- Considering landscape settings observed from a unit of the National Park system, National Historic Sites, National Trails, and cultural resources of tribal concern that may be a part of the historic context contributing to the historic significance of the site or trail.
- Project developers are encouraged to obtain topographical data of engineering-design quality and use digital terrain mapping tools at a landscape-viewshed scale for project location selection, site planning and design, visual impact analysis, and visual impact mitigation planning and design. The digital terrain-mapping tools shall be at a resolution and contour interval suitable for site design and accurate placement of proposed developments into the digital viewshed. Visual simulations shall be prepared and evaluated in accordance with BLM Handbook H-8431-1 and other agency directives, to create spatially accurate and realistic depictions of the appearance of proposed facilities. Simulations shall depict proposed project facilities from key observation points (KOPs) and other visual resource sensitive locations.
- Conducting outreach through public forums, as necessary, to disseminate visual resource information through methods such as offering organized tours of operating solar energy development projects, and using simulations in public presentations.
- Performing visual mitigation planning and design through field assessments, applied global positioning system (GPS) technology, photo documentation, use of computer-aided design and development software, three-dimensional GIS modeling software, and imaging software to depict visual simulations to reflect a full range of visual resource mitigation measures.

B.16.2 Site Characterization, Siting Design, and Construction

VR2-1 Solar facilities shall be sited and designed to minimize glint and glare.

(a) Identification of glint and glare effects shall include, but is not limited to, the following:

- Assessing and quantifying potential glint and glare effects and determining the potential safety and visual impacts associated with glint and glare using appropriate and commonly accepted software, procedures, and past project examples.
- Having qualified individuals conduct assessments for glint and glare.

(b) Methods to minimize glint and glare effects may include, but are not limited to, the following:

- Limiting use of signs and project construction signs. Beyond those required for basic facility and company identification for safety, navigation, and delivery purposes, commercial symbols or signs and associated lighting on buildings and other structures should be prohibited.
- Utilizing retro-reflective or luminescent markers in lieu of permanent lighting.
- Minimizing off-site visibility of all commercial symbols and signs, and associated lighting. Necessary signs should be made of non-glare materials and utilize unobtrusive colors. The reverse sides of signs and mounts should be painted or coated using a suitable color selected from the BLM Standard Environmental Color Chart to reduce contrasts with the existing landscape. However, placement and design of any signs required by safety regulations must conform to regulatory requirements.
- Considering off-site mitigation of visual impacts. In some situations, off-site mitigation may serve as a means to offset and/or recover the loss of visual landscape integrity. For example, off-site mitigation could include reclaiming unnecessary roads, removing abandoned buildings, reclaiming abandoned mine sites, putting utility lines underground, rehabilitating and revegetating existing erosion or disturbed areas, or establishing scenic conservation easements. Appropriate off-site mitigation will be determined on a project-specific basis in consultation with the BLM.

VR2-2 Solar facilities shall be sited and designed to minimize night-sky effects.

(a) Identification of night-sky effects shall include, but is not limited to, the following:

- Assessing and quantifying potential lighting impacts on the night sky and nocturnal wildlife, while providing lighting for hazard marking, safety, and other necessary site needs.
- Conducting assessments for night-sky effects by qualified individuals using appropriate and commonly accepted procedures and past project examples.

(b) Methods to minimize night-sky effects may include, but are not limited to, the following:

- Using minimum intensity lighting that meets safety criteria. When accurate color rendition is not required (e.g., roadway basic security), lighting shall be amber in color, using low-pressure sodium lamps, yellow LED lighting, or equivalent. When white light is required for accurate color rendition, it shall be equal to or less than 3500° Kelvin color temperature. Bluish-white lighting is discouraged.

- Prohibiting the use of red or white strobe lighting unless the BLM approves its use because of conflicting mitigation requirements.
- Fully shielding all permanent lighting (e.g., full cutoff), except for collision markers required by the FAA or other emergency lighting triggered by alarms.
- Mount lighting so that no light is emitted above an imaginary horizontal plane through the fixture.
- Considering lighting control through timers, sensors, dimmers, or switches that are available to facility operators.
- Considering vehicle-mounted lights over permanently mounted lighting for nighttime maintenance activities. When possible, such vehicle-mounted lighting shall be aimed toward the ground to avoid causing glare and skyglow.

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.

(a) Assessing visual dominance shall include, but is not limited to, the following:

- Conforming with VRM class objectives through the use of the BLM contrast rating procedures defined in BLM Handbook H-8431-1. Visual contrast rating mitigation of visual impacts shall abide by the requirements outlined in the handbook and other BLM directives. Revised project plans and simulations are to be reevaluated by using the contrast rating procedures.
- Selecting KOPs by first determining the extent of the viewshed using the viewshed modeling tools previously cited under VR1-1. The viewshed modeling shall illustrate the areas from which the proposed facilities may be seen out to 25 mi (40 km). From within the areas, KOPs are to be selected at places where people would be expected: scenic overlooks, roads, trails, campgrounds, recreationally active river corridors, residential areas, etc. For the purpose of conducting a visual contrast rating evaluation, the number of KOPs would be reduced to those that serve as the best representations for demonstrating conformance to the respective VRM class objectives. The BLM is consulted on the KOP selections, and reserves the right to require additional KOPs to further determine the extent of visual impacts and conformance to VRM class objectives.
- Integrating visual design elements into the construction plans, details, drawings, and specifications for the project.
- Incorporating facility siting measures to minimize the profile of all facility-related structures to reduce visibility and visual dominance within the viewshed, particularly for facilities proposed within the foreground/middleground distance zone (0–5 mi [0–8 km]) of sensitive viewing locations.

(b) Measures to minimize visual dominance may include, but are not limited to, the following:

- Using existing topography and vegetation as screening or partially screening devices.
- Incorporating visual design elements when planning for grubbing and clearing, vegetation thinning and clearing, grading, revegetation, drainage, and structural measures.
- Minimizing visual dominance of projects by siting projects outside the viewsheds of KOPs or by diminishing dominance through maximizing visible separation with distance.

- Avoiding, when feasible, locating facilities near visually prominent landscape features (e.g., knobs and waterfalls) that naturally draw an observer's attention.
- Avoiding visual "skylining" by placing structures, transmission lines, and other facilities away from ridgelines, summits, or other locations where they would silhouette against the sky from important viewing locations; however, consideration should be given to the potential for increased ground disturbance and other resource impacts.
- Designing linear features (e.g., ROWs and roads) to follow natural land contours rather than straight lines; however, consideration should be given to the potential for increased ground disturbance and other resource impacts.
- Locating linear developments (e.g., transmission lines, pipelines, roads) at the edges of natural clearings or natural lines of transition between vegetation type and topography.
- Considering alternative means of access in visually sensitive areas, to preserve the natural landscape conditions between tower locations.
- Minimizing vegetation and ground disturbance, and taking advantage of existing clearings where feasible.
- Reducing cut and fill for structures and roads by design and location. Retaining walls, bin walls, half bridges, etc., can be used to reduce cut and fill.
- Considering rounded and varied road-cut slopes and the cut-and-fill pitches to reduce contrasts in form and line; encouraging slope cuts to preserve specimen trees and nonhazardous rock outcroppings.
- Considering sculpting and shaping natural or previously excavated bedrock landforms when excavation of these landforms is required. For example, percent backslope, benches, and vertical variations may be integrated into a final landform that repeats the natural shapes, forms, textures, and lines of the surrounding landscape. The earthen landform may be integrated and transitioned into the excavated bedrock landform. Sculpted rock face angles, bench formations, and backslopes could adhere to the natural bedding planes of the natural bedrock geology. The color contrast from the excavated rock faces may be removed by color treating with a rock stain. Native vegetation or a mix of native and nonnative species (if necessary to ensure successful revegetation) could be reestablished with the benches and cavities created within the created bedrock formation.
- Designing and installing natural-looking earthwork landforms, or vegetative or architectural screening to minimize visual impacts. Considering shape and height of earthwork landforms for adaptation to the surrounding landscape.
- Repeating the size, shape, and characteristics of naturally occurring openings in vegetation for facilities, structures, roads, etc.
- Burying electrical collector lines, pipelines, and communication and local utility lines to minimize additional surface disturbance, where feasible (e.g., along roads or other paths of surface disturbance).
- Minimizing visual impacts associated with solar energy and electricity transmission projects by choosing appropriate building and structural materials and surface treatments (i.e., paints or coatings designed to reduce contrast and reflectivity). A careful study of the site should be performed to identify appropriate colors and textures for materials; both summer and winter appearance shall be considered, as well as seasons of peak visitor use. Materials and surface

treatments shall repeat and/or blend with the existing form, line, color, and texture of the landscape.

- Considering the typical viewing distances and landscape when choosing colors. Appropriate colors for smooth surfaces often need to be two to three shades darker than the background color to compensate for shadows that darken most textured natural surfaces. The BLM Standard Environmental Color Chart CC-001 and guidance shall be referenced when selecting colors.
- Selecting appropriately colored materials for structures, or stains/coatings to blend with the project's backdrop. Materials, coatings, or paints having little or no reflectivity shall be used whenever possible.
- Color treating solar panel/mirror/heliostat backs/supports to reduce visual contrast with the landscape setting.
- Color treating solar towers to reduce visual contrast.
- Considering multiple-color camouflage technology application projects within sensitive viewsheds and with a visibility distance that is between 0.25 and 2 mi (0.40 and 3.20 km).
- Matching aboveground pipelines' paint or coating to their surroundings.
- Considering the appropriate choice of monopoles versus lattice towers for a given landscape setting to further reduce visual impacts.
- Utilizing nonspecular conductors and nonreflective coatings on insulators for electricity transmission/distribution projects.
- Minimizing the use of signs. Where signs are necessary, they shall be made of non-glare materials and utilize unobtrusive colors. The reverse sides of signs and mounts shall be painted or coated by using the most suitable color selected from the BLM Standard Environmental Color Chart; however, placement and design of any signs required by safety regulations must conform to regulatory requirements.
- Clearly delineating construction boundaries and minimizing areas of surface disturbance; preserving vegetation to the greatest extent possible; utilizing undulating surface disturbance edges; stripping, salvaging, and replacing topsoil; using contoured grading; controlling erosion; using dust suppression techniques; and stabilizing exposed soils.
- Preserving existing rocks, vegetation, and drainage patterns to the maximum extent possible.
- Employing brush beating, mowing, or the use of protective surface matting rather than removing vegetation.
- Considering mulching and spreading slash from vegetation removal over fresh soil disturbances.
- Avoiding leaving slash piles in sensitive viewing areas.
- Considering restoration of disturbed soils by use of weed-free, native grasses, forbs, and shrubs representative of the surrounding and intact native vegetation composition and/or using nonnative species, if necessary, to ensure successful revegetation.
- Reducing the visual color contrast of graveled surfaces with approved color-treatment practices.
- Considering segregating and spreading topsoil from cut-and-fill activities on freshly disturbed areas to reduce color contrast.
- Avoiding leaving topsoil piles in sensitive viewing areas.
- Spreading excess cut-and-fill material within project disturbance area and vegetate per approved restoration plan requirements, while maintaining natural drainage pathways. Where soil cannot

reasonably be spread within project disturbance areas, excess cut-and-fill materials should be hauled out to minimize ground disturbance and impacts from piles.

- Removing stakes and flagging from the construction area after completion of construction.

VR2-4 Project developer shall perform a preconstruction meeting with BLM or their designated visual/scenic resource specialists, such as a landscape architect, to coordinate the project construction VRM mitigation strategy. Final design and construction documents will be reviewed with regard to the visual mitigation elements, assuring that requirements and commitments are adequately addressed. The review of construction documents will include, but not be limited to, grading, drainage, revegetation, vegetation clearing, and feathering.

B.16.3 Operations and Maintenance

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.

(a) Maintaining the visual resource design elements during operations and maintenance shall include, but is not limited to, the following:

- Maintaining revegetated surfaces until a self-sustaining stand of vegetation is reestablished and visually adapted to the undisturbed surrounding vegetation. No new disturbance shall be created during operations without completion of a VRM analysis and approval by the BLM authorized officer.
- Keeping painted and color-treated facilities in good repair and repainting when the color fades or flakes.
- Using interim restoration during the operating life of the project as soon as possible after land disturbances.
- Including dust abatement and noxious weed control in maintenance activities.
- Deploying and operating mirrors/heliostats to avoid high-intensity light (glare) reflected off-site. Where off-site glare is unavoidable and project site/off-site spatial relationships favor effective results, fencing with privacy slats or similar screening materials should be considered.

B.16.4 Reclamation and Decommissioning

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.

(a) Methods for minimizing visual contrast associated with reclamation and decommissioning of the project may include, but are not limited to, the following:

- Including treatments, such as thinning and feathering vegetation along project edges, enhanced contour grading, salvaging landscape materials from within construction areas, special revegetation requirements (e.g., use of mix of native and nonnative species).
- Designing and implementing restoration of the project area to predevelopment visual conditions and the inventoried visual quality rating, or to that of the surrounding landscape setting conditions, to the best extent possible or to conditions agreed upon by the BLM.
- Removing aboveground and near-ground-level structures. Some structures may need to be removed to a level below the ground surface to allow reclamation/restoration.
- Considering contouring soil borrow areas, cut-and-fill slopes, berms, water bars, and other disturbed areas to approximate naturally occurring slopes. Contouring to a rough texture would trap seeds and discourage off-road travel, thereby reducing associated visual impacts. Cut slopes can be randomly scarified and roughened to reduce texture contrasts with existing landscapes and aid in revegetation.
- Utilizing native vegetation to establish a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape.
- Reapplying stockpiled topsoil to disturbed areas, where applicable, or using a mix of native and nonnative species if necessary to ensure successful revegetation.
- Removing or burying gravel and other surface treatments.
- Restoring rocks, brush, and forest to approximate preexisting visual conditions.
- Integrating feathering edges of vegetation to reduce form and line contrasts with the existing landscapes.

B.16.5 Other Best Management Practices

The use of BMPs to avoid or reduce the visual impacts of development is a key component in the BLM's fulfillment of its scenic resource management requirements while meeting its goals to facilitate renewable energy development on BLM-administered lands. BLM BMPs to reduce visual impacts are found in the following publications:

- Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands (BLM 2013)[5]—Chapter 4 contains BMPs for solar energy developments (such as using color-treated solar collectors and support structures) and general BMPs for renewable energy developments (such as collocating linear features in existing ROWs or corridors).
- Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Lands (Sullivan et al. 2023)[6]—Chapter 5 contains BMPs for artificial light at night on BLM-administered lands, such as having a lighting plan prepared by a qualified lighting designer.

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[5] https://blmwyomingvisual.anl.gov/docs/BLM_RenewableEnergyVisualBMPs_LowRes.pdf
[6] https://www.blm.gov/sites/default/files/docs/2023-04/Library_BLMTechnicalNote457_final.pdf

B.17 PRELIMINARY WASTES AND MATERIALS – HAZARDOUS AND SOLID (HAZARDOUS MATERIALS AND WASTE) DESIGN FEATURES

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.20.1 and 5.20.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on hazardous materials and waste from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.17.1 General

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.

(a) Assessing hazardous material and waste concerns shall include, but is not limited to, the following:

- Identifying expected waste generation streams at the solar energy site and hazardous waste storage locations for consideration in the environmental analysis evaluating the proposed project.
- Conducting site characterization, construction, operation, and decommissioning activities in compliance with applicable Federal and state laws and regulations, including the Toxic Substances Control Act of 1976, as amended (15 USC 2601, et seq.). An example of complying with applicable law is reporting any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR Part 117 as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Section 102b.
- Evaluating impacts related to potential hazardous material and waste as part of the environmental impact analysis for the project and considering options to minimize and/or mitigate impacts in coordination with the BLM.

(b) Methods to minimize hazardous material and waste related impacts shall include, but are not limited to, the following:

- Developing a Hazardous Materials and Waste Management Plan that addresses the selection, transport, storage, and use of all hazardous materials needed for construction, operations, and decommissioning of the facility for local emergency response and public safety authorities and for the designated BLM land manager. Furthermore, the plan shall address the characterization, on-site storage, recycling, and disposal of all resulting wastes.1 At minimum, the plan will discuss facility identification; comprehensive hazardous materials inventory; Material Safety Data Sheets for each type of hazardous material; emergency contacts and mutual aid agreements, if any; site map showing all hazardous materials and waste storage and use locations; copies of spill and emergency response plans, and hazardous materials–related elements of a Decommissioning and Site Reclamation Plan.
  - It is not anticipated that any solar energy facility would have hazardous chemicals present on-site in such quantities as to require development of a Risk Management Plan as specified in 40 CFR Part 68.
- Planning for waste management will address all solid and liquid wastes that may be generated at the site in compliance with the CWA requirements to obtain the project's NPDES or similar permit.

- Considering fire management in developing hazardous materials and waste management measures.
- Identifying and implementing prevention measures, including material substitution of less hazardous alternatives, recycling, and waste minimization.
- Establishing procedures for fuel storage and dispensing that consider health and safety of personnel and methods for safe use (i.e., fire safety, authorized equipment use).
- Ensuring vehicles and equipment are in proper working condition to reduce potential for leaks of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials.
- Considering establishing schedules regular removal of wastes (including sanitary wastewater generated in temporary, portable sanitary facilities) for delivery and removal by licensed haulers to appropriate off-site treatment or disposal facilities.

B.17.2 Site Characterization, Siting and Design, Construction

HMW2-1 Solar facilities shall be characterized, sited and designed, and constructed to minimize hazardous materials and waste management design elements.

(a) Methods to minimize hazardous material and waste management impacts may include, but are not limited to, the following:

- Indemnifying the United States against any liability arising from the release of any hazardous substance or hazardous waste on the facility or associated with facility activities.
- Providing a copy of any report required or requested by any Federal agency or state government as a result of a reportable release or spill of any toxic substances shall be furnished to the BLM authorized officer concurrent with the filing of the reports to the involved Federal agency or state government.
- Designing and operating systems containing hazardous materials in a manner that limits the potential for their release.
- Establishing measures for construction with compatible materials in safe conditions.
- Establishing dedicated areas with secondary containment for offloading hazardous materials transport vehicles.
- Implementing "just-in-time" ordering procedures designed to limit the amounts of hazardous materials present on the site to quantities minimally necessary to support continued operations. Excess hazardous materials shall receive prompt disposition.
- Surveying project sites for unexploded ordnance, especially if projects are within 20 mi (32 km) of a current DoD installation or formerly utilized defense site.
- Siting refueling areas away from surface water locations and drainages and on paved surfaces; features shall be added to direct any spilled materials to sumps or safe storage areas where they can be subsequently recovered.
- Designating hazardous materials and waste storage areas and facilities. Limiting access to designated areas to authorized personnel only.

B.17.3 Operations and Maintenance

HMW3-1 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.

(a) Methods for maintaining compliance with the terms and conditions for hazardous materials and waste management during operations and maintenance of the project may include, but are not limited to, the following:

- Installing sensors or other devices to monitor system integrity.
- Implementing robust site inspection and repair procedures.

B.17.4 Reclamation and Decommissioning

HMW4-1 Project developers shall maintain emergency response capabilities throughout the reclamation and decommissioning period as long as hazardous materials and wastes remain on-site.

HMW4-2 All design features developed for the construction phase shall be applied to similar activities during the reclamation and decommissioning phases.

B.18 PRELIMINARY WILD HORSES AND BURROS DESIGN FEATURES

The following design features from the Final Solar PEIS (BLM 2012; Sections 5.4.2.1 and 5.4.2.2), presented by project phase, have been identified to avoid, minimize, and/or mitigate potential impacts on water resources from solar energy development. Design features not applicable to the Esmeralda 7 planning area have been omitted where applicable.

B.18.1 General

WHB1-1 Project developers shall coordinate with the BLM and other stakeholders early in the project planning process to assess and consider options to avoid, minimize, and/or mitigate impacts on wild horses and burros and their management areas.

(a) Assessing impacts on wild horses and burros and their management areas shall include, but is not limited to, the following:

- Identifying wild horses and burros and their management areas in proximity to the proposed projects. In coordination with the BLM, developers shall consult existing land use plans and updated inventories.
- Evaluating potential impacts on wild horses and burros and their management areas as part of the environmental impact analysis for the project and considering options to avoid, minimize, and/or mitigate adverse impacts in coordination with the BLM.

(b) Methods to minimize impacts on wild horses and burros and their management areas may include, but are not limited to, the following:

- Installing fencing and access control.
- Providing for movement corridors.
- Delineating open range.
- Requiring traffic management measures (e.g., vehicle speed limits).

- Ensuring access to or replacement of water sources.
- Incorporating key elements to mitigate impacts on wild horses and burros in a WEAP that is provided to all project personnel prior to entering the project worksite. The WEAP shall be provided on a regular basis, covering multiple resources, to ensure the awareness of key wild horse and burro mitigation efforts of the project worksite during all phases of the project's life. The base information the WEAP provides shall be reviewed and approved by the BLM prior to the issuance of a Notice to Proceed and incorporates adaptive management protocols for addressing changes over the life of the project, should they occur.

B.18.2 Site Characterization, Siting and Design, Construction

WHB2-1 Project access roads shall be sited, designed, constructed, fenced, and/or improved to minimize potential wild horse and burro collisions. Fences, or other appropriate structures, should be constructed to exclude wild horses and burros from solar energy project site facilities. Either water sources or access routes to water sources for horses and burros should be excluded from the solar energy development area, or alternate water sources or routes should be provided.

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Appendix C

Evaluation of the Nominated Esmeralda/Fish Lake Area of Critical Environmental Concern

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Evaluation of the Nominated Esmeralda/Fish Lake Area of Critical Environmental Concern (Final)

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MARCH 2024

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Acronyms and Abbreviations

Term	Definition
ACEC	Area of Critical Environmental Concern
APE	Area of Potential Effect
BLM	Bureau of Land Management
cal B.P.	calibrated years before present
CFR	Code of Federal Regulations
DPS	distinct population segment
ESA	Endangered Species Act of 1973
FCR	fire-cracked rock
FLPMA	Federal Land Policy and Management Act
IPaC	Information for Planning and Consultation
MRHMD	Mineral Ridge Historic Mining District
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NRHP	National Register of Historic Places
NVCRIS	Nevada Cultural Resource Information System
OHV	off-highway vehicle
PFYC	Potential Fossil Yield Classification
R&I	relevance and importance
RMP	resource management plan
SHPO	State Historic Preservation Office
THPO	Tribal Historic Preservation Officer
USFWS	U.S. Fish and Wildlife Service
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WSA	Wilderness Study Area
XRF	x-ray fluorescence

1.0 INTRODUCTION

An Area of Critical Environmental Concern (ACEC) is defined as an area "within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards" (43 Code of Federal Regulations [CFR] 1610.7-2(b)). ACEC designation is an administrative designation used by the Bureau of Land Management (BLM) that is accomplished through the land use planning process. The Federal Land Policy and Management Act (FLPMA) states that the BLM will give priority to the designation and protection of ACECs in the development and revision of land use plans. To be designated as an ACEC, a proposed area must meet criteria for both relevance and importance (R&I), as found in 43 CFR 1610.7-2(a)(b) and defined in BLM Manual 1613, *Areas of Critical Environmental Concern* (BLM 1988).

During the public comment period for the Greenlink West Project Draft Environmental Impact Statement/Resource Management Plan Amendments, the BLM received a nomination from Friends of Nevada Wilderness for the Esmeralda/Fish Lake ACEC (FNW 2023). The nominated Esmeralda/Fish Lake ACEC covers approximately 849,170 acres of BLM-administered lands in Esmeralda and Mineral counties, Nevada. The BLM lands within the nominated ACEC include lands in the Carson City and Battle Mountain District Offices. Friends of Nevada Wilderness considered the following values within the nominated ACEC:

- Landscape intactness
- Climate resiliency
- Ecological connectivity
- Opportunities for conservation and restoration
- Natural resources
- Cultural resources
- Scenic resources
- Paleontological resources
- Unique geological resources
- Dark-sky resources
- Endangered and endemic species
- Species richness
- Sensitive soils
- Crucial watershed for aquifers
- Regional springs

This ACEC report overviews the ACEC process and evaluates the nominated Esmeralda/Fish Lake ACEC to determine whether it meets the R&I criteria for this designation and whether special management attention is required in the interim until the nomination is evaluated under a land use planning process.

2.0 OVERVIEW OF THE PROCESS

2.1 Identifying ACECs

In order to be eligible for designation as an ACEC, an area must be identified, considered, and analyzed for R&I criteria in accordance with FLPMA, 43 U.S. Code 1712(c)(3), BLM Manual 1613, *Areas of Critical Environmental Concern*, and 43 CFR 1610.7-2, as follows.

- Areas having potential for ACEC designation and protection management will be identified and considered throughout the resource-management planning process (see 43 CFR 1610.4–1 through 1610.4–9).
- The inventory data will be analyzed to determine whether there are areas containing resources, values, systems, processes, or hazards eligible for further consideration for designation as an ACEC. In order to be a potential ACEC, both of the following criteria must be met.
    - **Relevance***.* There will be present a significant historic, cultural, or scenic value, a fish or wildlife resource or other natural system or process, or natural hazard.
    - **Importance***.* The above-described value, resource, system, process, or hazard will have substantial significance and values. This generally requires qualities of special worth, consequence, meaning, distinctiveness, or cause for concern. A natural hazard can be important if it is a significant threat to human life or property.
- The State Director, on approval of a draft resource management plan (RMP), plan revision, or plan amendment involving ACECs, will publish a notice in the *Federal Register* listing each ACEC proposed and specifying the resource use limitations, if any, that would occur if it were formally designated. The notice will provide a 60-day period for public comment on the proposed ACEC designation. The approval of an RMP, plan revision, or plan amendment constitutes formal designation of any ACEC involved. The approved plan will include the general management practices and uses, including mitigation measures, identified to protect the designated ACEC (43 CFR 1610.7-2).

2.2 Special Management Attention

BLM Manual 1613 identifies *special management attention* as

> "management prescriptions developed during preparation of an RMP or amendment expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP, including proposed actions deemed to be in conformance with the terms, conditions, and decisions of the RMP."

These are management measures that would not be necessary and prescribed if the relevant and important values were not present. A management prescription is considered to be *special* if it is unique to the area involved and includes terms and conditions specifically designed to protect the values occurring within the area.

2.3 Nomination and Evaluation of ACECs

ACECs can be nominated at any time, but they are only designated through the BLM's land use planning process. Potential ACECs can be nominated by BLM staff, interested parties, or members of the public. During the land use planning process, the BLM would review all BLM-administered public lands (i.e., surface acres) within the RMP planning area to determine whether any should be considered for designation as ACECs. The BLM would also solicit ACEC nominations from the public as part of the scoping process. In the case of the nominated Esmeralda/Fish Lake ACEC, the nomination was received outside of an RMP revision process; instead, it was received during an applicant-driven process initiated by the filing of a right-of-way application.

Following receipt of a nominated ACEC, the BLM evaluates the nomination to determine whether it meets the R&I criteria described in Section 2.4, *Relevance Criteria*, and Section 2.5, *Importance Criteria*, below. A nomination must meet one or more of the R&I criteria to be considered a potential ACEC. The need for special management and the resulting effects from applying such management would be assessed in the environmental analysis for the land use planning process, and the BLM would make a determination to designate or not designate the ACEC.

The BLM has decided to evaluate the nominated Esmeralda/Fish Lake ACEC at this time because it was nominated as part of the ongoing National Environmental Policy Act (NEPA) process for the Greenlink West Project. If the nominated ACEC meets the R&I criteria and special management attention is required, as documented in this report, BLM will decide whether to designate or not designate the Esmeralda/Fish Lake as an ACEC during the next land use planning process.

2.4 Relevance Criteria

To meet the criteria for relevance, an area must possess, "significant historic, cultural, or scenic value; a fish and wildlife resource or other natural system or process; or natural hazard" (43 CFR 1610.7-2). An area has relevance if it meets one or more of the following:

1. **A significant historic, cultural, or scenic value** (including, but not limited to, rare or sensitive archeological resources and religious or cultural resources important to Native Americans).
2. **A fish and wildlife resource** (including, but not limited to, habitat for Endangered, Sensitive, or Threatened species, or habitat essential for maintaining species diversity).
3. **A natural process or system** (including, but not limited to, Endangered, Sensitive, or Threatened plant species; rare, endemic, or relic plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features).
4. **Natural hazards** (including, but not limited to, acres of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs). A hazard caused by human action may meet the relevance criteria if it is determined through the RMP process that it has become part of a natural process.

2.5 Importance Criteria

To meet the importance criteria, the value, resource, system, process, or hazard resource must "have substantial significance and value" (43 CFR 1610.7-2). This generally requires qualities of special worth, consequence, meaning, distinctiveness, or cause for concern—especially compared to any similar resource—or qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, Endangered, Threatened, or vulnerable to adverse change. A natural hazard can be important if it is a significant threat to human life or property.

A proposed area meets the importance criteria if the area has one or more of the following characteristics present.

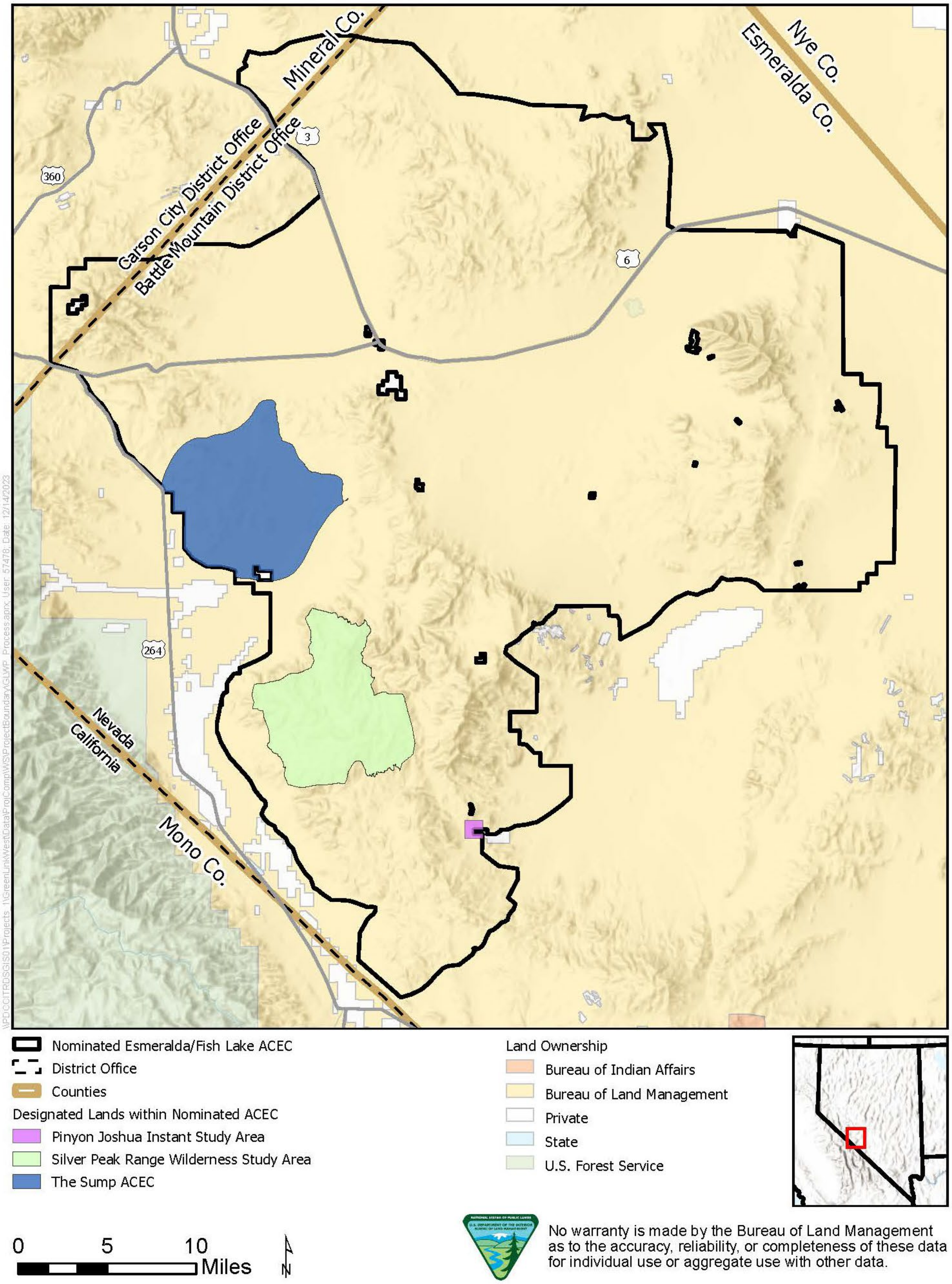
1. Has more than locally significant qualities that give it special worth, consequence, meaning, distinctiveness, or cause for concern, especially compared to any similar resource.
2. Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, Endangered, Threatened, or vulnerable to adverse change.

3. Has been recognized as warranting protection in order to satisfy national priority concerns or to carry out the mandates of FLPMA.
4. Has qualities that warrant highlighting in order to satisfy public or management concerns about safety and public welfare.
5. Poses a significant threat to human life and safety or to property.

2.6 Area Considered

The nominated Esmeralda/Fish Lake ACEC covers approximately 849,170 acres of BLM-administered lands in Esmeralda and Mineral counties, Nevada (Figure 1). BLM lands within the nominated ACEC include lands in the Carson City and Battle Mountain District Offices, and management of these lands is under the Tonopah RMP (BLM 1997) and the Carson City Consolidated RMP (BLM 2001). Within the nominated ACEC are three BLM special designations: (1) The Sump ACEC (41,863 acres); (2) the Silver Peak Wilderness Study Area (WSA) (33,900 acres); and (3) the Pinyon Joshua Instant Study Area (560 acres).

Figure 1. Nominated Esmeralda/Fish Lake ACEC



2.7 Summary of Relevance and Importance Criteria Determinations

Table 2-1 summarizes the BLM's determinations of R&I criteria for the nominated Esmeralda/Fish Lake ACEC.

Table 2-1. Summary of Relevance and Importance Criteria Determinations

#	Criterion	Summary	Determination
Relevance Criteria			
1	Significant Historic, Cultural, or Scenic Value	Including, but not limited to, rare or sensitive archaeological resources and religious or cultural resources important to Native Americans, or scenic values.	Criterion has been met.
2	Fish and Wildlife Resource	Including, but not limited to, habitat for Endangered, Sensitive, or Threatened species; or habitat essential for maintaining species diversity.	Criterion has been met.
3	Natural Process or System	Including, but not limited to, Endangered, Sensitive, or Threatened plant species; rare, endemic, or relict plants or plant communities that are terrestrial, aquatic, or riparian; or rare geological features.	Criterion has been met.
4	Natural Hazards	Including, but not limited to, areas of avalanche, dangerous flooding, landslides, unstable soils, seismic activity, or dangerous cliffs. A hazard caused by human action may meet the relevance criteria if it is determined through the resource management planning process that it has become part of a natural process.	Criterion has not been met.
Importance Criteria			
1	More Than Local Significance	Has significant qualities that give it special worth, consequence, meaning, and distinctiveness for contributing to ecosystem resilience and protecting landscape intactness and habitat connectivity.	Criterion has been met.
2	Fragile and Sensitive Qualities	Has qualities or circumstances that make it fragile, sensitive, rare, irreplaceable, exemplary, unique, Endangered, Threatened, or vulnerable to adverse change.	Criterion has been met.
3	National Priority Concerns	Has been recognized as warranting protection to satisfy national priority concerns or carry out the mandates of FLPMA.	Criterion has not been met.
4	Public and Management Concerns	Has qualities that warrant highlighting to satisfy public or management concerns about safety and public welfare.	Criterion has not been met.
5	Threats to Human Life or Property	Poses a significant threat to human life and safety or to property.	Criterion has not been met.

3.0 DETERMINATION OF RELEVANCE

This section identifies each relevance criterion, assesses the values of the nominated ACEC, indicates whether the relevance criteria were met, and includes a justification for those determinations.

3.1 Cultural and Scenic Resources (Relevance Criterion 1)

3.1.1 Cultural Resources

3.1.1.1 Cultural Resources Within the Nominated ACEC

3.1.1.1.1 Historic Properties

The ACEC nomination states

> "the Silver Peak WSA and contiguous additions include significant cultural resources and landscapes, which are important to the lifeways, and cultural history of Native Americans and are part of the traditional and unceded homelands of the Timbisha Shoshone, Western Shoshone, Northern Paiute, and Eastern Mono people (FNW 2023:9)."

However, the ACEC nomination does not recognize that the Timbisha Shoshone are Western Shoshone. Western Shoshone is an ethic identity to which many tribes belong. Other tribes that identify as Western Shoshone and that have consulted on activities in the area include the Yomba Shoshone Tribe and the Duckwater Shoshone Tribe. Since Western Shoshone is an ethnic identity that extends beyond tribal membership, there may be additional tribes with an interest in this area.

Currently, a total of 836 archaeological sites and 36 Historic Properties have been recorded within the nominated ACEC according to the Nevada Cultural Resource Information System (NVCRIS) database, with the majority comprising prehistoric Native American sites. *Historic properties* are defined as

> "any prehistoric or historic district, site, building, structure, or object include in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR § 800.16)."

3.1.1.1.2 Historic Sites

Historic archaeological sites within the nominated ACEC boundary consist primarily of mining-related industrial sites. Vein deposits in the Tonopah area contain many examples of epithermal gold/silver-bearing deposits located within volcanic or sedimentary rock that are classified as quartz-adularia deposits (Sherlock et al. 1996). The discovery of silver led to a boom of prospecting, mining claims, and local development related to the mining, smelting, refining, and transportation of ore.

<u>Mineral Ridge Historic Mining District</u>

The Mineral Ridge Historic Mining District (MRHMD), a large, historic, rural landscape located within the Mineral Ridge portion of the Silver Peak Range, is associated with silver- and gold-mining operations. The boundaries of the MRHMD were defined to include the towns of Silver Peak and Blair, in addition to the various surrounding canyons, which contain the targeted geological stratums (Zeier 1996). In this case, the period of significance ranges from 1863 to 1942. Historic sites and features within the district were individually assessed for their ability to contribute to the elements and themes of the various historically significant periods for the district (Zeier 1996). The district comprises a wide variety of historic features and structures related to the complete mining systems, transportation networks, water-conveyance systems, and other mining-related activities. Some examples of these features include rock-cairn claim markers, prospecting pits, short-term and long-term habitational structures, mining complexes (e.g., shafts and adits, railroad lines, pipelines, shafts/hoists, mills), and other processing facilities.

Relevance (No): The MRHMD consists of approximately 173 historic site components, 263 isolated historic elements, and 15 architectural elements, of which 29 historic sites, 23 isolated historic elements, and 9 architectural elements were recommended as contributing to the district (Kautz 2012; Felling 2018; Jamaldin et al. 2020). Additionally, the district covers an area of approximately 18,579 acres in Esmerald County, Nevada; however, the majority is located outside the boundary of the nominated ACEC. Approximately 2,803 acres of the district are within the nominated ACEC, accounting for 15 percent of the total area of the MRHMD. Therefore, with the majority of the district residing outside of the nominated ACEC, the district does not meet the relevance criterion.

Pacific Borax Works

The ACEC nomination specifically mentions the historic borax works located within the lower Fish Lake Valley as a known area of historical significance (FNW 2023:9). The site was originally recorded in 1982 by Alvin R. McLane when a flake was observed in proximity to a concentration of borax tailings (McLane 1982). WestLand Engineering & Environmental Services revisited and updated the site in 2023. The site consists of a moderate-density artifact scatter with 12 features across an area measuring 925 feet by 975 feet. The features are primarily earthwork and include earthen mounds, rock mounds, ponds, and depressions. No prehistoric artifacts were recorded during the 2023 revisit, but a variety of modern impacts were documented, including cattle trampling, drainage cuts, push piles, and possible collecting/looting activity. During this update, it was noted that there is a paucity of original borax works on site, which would indicate the refining process (Powell et al. 2023). Additionally, no extant buildings or original processing equipment remain that are described in historical documents on record.

Relevance (No): This resource is not unique as many borax works operated in southwest Nevada during this period, and the site has experienced a variety of post-abandonment impacts to site integrity including natural erosional impacts and human impacts such as cattle trampling, modern earth modification, and possible looting/collecting activities (Powell et al. 2023). Further, the artifact assemblage lacks a substantive variety of unique artifacts that would provide meaningful data about identified historic research themes (mining, utility systems, or ranching). The site was recommended ineligible for inclusion in the NRHP. Therefore, the site does not meet the relevance criterion.

3.1.1.1.3 Prehistoric Sites

The ACEC nomination specifically mentioned several prehistoric site types, including rock shelter habitations, lithic scatters, and rock writing sites that are prevalent throughout the nominated ACEC (FNW 2023:9). Currently, 596 documented prehistoric sites are within the nominated ACEC, with 24 eligible for listing on the National Register of Historic Places (NRHP). Site types deemed relevant to the ACEC nomination and discussed below include rock writing, rock shelters, open lithic scatters, open habitations, and lithic quarries, which are discussed as to whether they meet either the relevance or importance criterion as outlined in the BLM Manual 1613, *Areas of Critical Environmental Concern* (BLM 1988).

Cave Spring

The ACEC nomination expressed concern that rock writing pictographs and petroglyphs with associated archaeological deposits may be present within the boundaries of the nominated ACEC (FNW 2023:9). However, this is the only documented rock writing site within the nominated ACEC. The Cave Spring multicomponent site consists of a prehistoric rock shelter with pictographs and a historic cabin with ranching-associated surface features. This site has received a significant amount of archaeological attention from the BLM Tonopah Field Office because of several archaeological surveys performed in the area and documented looting, which has occurred at this site.

The prehistoric component consists of two alcoves, two pictograph panels containing white-and-red pigment, and a large subsurface deposit outside of the alcoves. Desert Research Institute conducted the initial testing in 1995 due to reports of looting and consisted of two 1-square-meter units (Livingston 1995). The testing aimed to determine if the site contained an intact subsurface archaeological deposit that would make it eligible for the NRHP. A large artifact assemblage was documented from the two units, including brown ware ceramic sherds and many projectile points and bifacial tools. Consequently, the site was recommended eligible for the NRHP under Criterion D, based its “demonstrated ability to deliver archaeological data from a reasonably intact cultural deposit that pertains to research issues of prehistoric chronology, subsistence-settlement patterns, obsidian use and conveyance, and possibly exchange” (Moore and Patsch 2011).

Aside from NRHP eligibility, the Cave Spring site contains culturally sensitive and important pictograph panels within the alcove. Specifically, these pictographs are known as Great Basin painted pictographs (Heizer and Baumhoff 1962), examples of which are extremely rare in surrounding area. The site is a known sacred place and is considered an important cultural resource to the Timbisha Shoshone, who view the site as both a habitation site and a ceremonial location (Giambastiani 2016, 2019). Furthermore, the location remains important to their history and identity related to past events of cultural significance at the site.

Radiometric dating and temporally diagnostic artifacts date the prehistoric component of the site to 6,182 to 5,942 calibrated years before present (cal B.P.) and reflect repeated occupations throughout the Late Archaic period up to 2920 to 2765 (ca B.P) (Giambastiani 2019:49). Additionally, recovery of Great Basin brown ware sherds, a diagnostic pottery type dating from approximately 1000 cal B.P to historic times in the western Great Basin (Eerkens 2003; Rhode 1994). The use of both absolute and relative dating of this site demonstrates its consistent use throughout several prehistoric time periods and validates the cultural importance of the site.

The historic component is more expansive than the prehistoric component and consists of a spare surface scatter and nine structural remnants, including a stone cabin, a corral, several rock walls, and a developed water transportation system connecting the spring to the corral. Additionally, it appears that the cabin has been maintained and used periodically up to modern times. Despite this, the historic component was recommended eligible for addition to the NRHP under Criteria A, C, and D.

Relevance (Yes): The ACEC nomination presented an overstatement of the prevalence of rock writing sites within the Silver Peaks WSA (FNW 2023:9). According to the NVCRIS database, only one pictograph site was recorded within the nominated ACEC boundary. However, there is a high probability that more rock writing sites may be located if certain portions of the nominated ACEC were subjected to a thorough intensive pedestrian archaeological survey. Undocumented cultural resources are addressed further in separate category, below. Both the prehistoric and historic components of the site retain integrity and would be eligible for inclusion in the NRHP. Additionally, this site is an archaeological resource that is considered especially rare and sensitive and contains religious or cultural resources that are extremely important to Native Americans. Therefore, this site meets the relevance criterion.

Lithic Quarries

Although not specifically mentioned in the ACEC nomination, a large number of prehistoric lithic quarry locations are within the nominated ACEC. A total of 48 documented lithic quarries are within the nominated ACEC, including one NHRP-eligible resource. These quarries were primarily used for the procurement of high-quality tool-stone materials, such as rhyolite, chert, and chalcedony. These raw materials were likely the materials observed at many of the lithic-reduction scatter sites present throughout much of the nominated ACEC boundary. The eligible lithic quarry site is situated on a ridgetop and exhibits early-stage tool reduction and lithic procurement activities. The site consists of five core reduction loci containing numerous cores, approximately 500 primary decortication and secondary flakes, and shatter. Raw materials on site consist primarily of chalcedony and chert flaked-stone varieties, with one ground-stone basalt cobble anvil present. The site was not fully delineated because it extended outside of the project corridor during recordation and likely is quite a bit larger—the nearby deflated ridges have abundant tool-grade stone exposed on the surface.

Relevance (No): Lithic quarries are not particularly rare in the nominated ACEC or throughout the Great Basin as a whole. Although lithic quarries are generally affected by colluvial and alluvial erosion, fine-grained cryptocrystalline and meta-volcanic tool stones are highly resistant to subaerial erosion. Aside from movement downslope on these ridgetops, the surficial expression of the sites will remain intact. Additionally, these quarries do not contain large degrees of obsidian, which provides a significantly greater degree of scientific knowledge through hydration dating and X-ray fluorescence (XRF) sourcing analysis than does chert, chalcedony, or rhyolite outcroppings. Therefore, these resources are not considered a rare or sensitive archaeological resource and do not meet the relevance criterion.

Rock Shelters

The ACEC nomination expressed concerns for rock shelters that may exist within the nominated ACEC and may contain diagnostic tools and basketry (FNW 2023:9). The NVCRIS database shows approximately 12 rock shelters present within the nominated ACEC, with nine of them NRHP eligible. Cave Spring, discussed above, is the most well-known rock shelter within the nominated ACEC; however, several other eligible rock shelters also contain culturally significant rock features and intact subsurface archaeological deposits.

Assemblages at the eligible rock shelters are dominated by late-stage lithic reduction types, with mid-stage reduction in reduced quantities. Raw materials at these sites are primarily varieties of chert, chalcedony, and obsidian. The subsurface assemblage of these sites suggests that there have been multiple episodes of tool production and related maintenance and repair efforts at these locales. Additionally, relative dating of diagnostic tools has placed some of these sites to the Early to Middle Archaic. Although no basketry or cordage was documented, like the ACEC nomination suggested, a cut reed that was interpreted as a possible arrow shaft was documented at one rock shelter. This highlights the sensitivity of rock shelter sites and their ability to preserve archaeological artifacts that consist of biological material due to their extreme fragility and inability to preserve except in the best of depositional environments. In addition to the assemblages, several of these rock shelters contain rock rings and rock alignments within the drip line of the alcove, consisting of locally sourced basalt and rhyolite cobbles. The purpose of these rock features is unknown, though there was no evidence during the time of site recordation of fire-cracked rock (FCR) or smoke staining on the roof of the alcove. Given the lack of fire-related materials within and around these rock features, it is possible that they are related to the religious or spiritual practices of the prehistoric occupants.

Relevance (Yes): Rock shelters are considered especially rare and sensitive archaeological resources due to their ability to contain surface and subsurface archaeological deposits that are protected from subaerial erosion and, thus, may contain extremely fragile archaeological artifacts, such as basketry or arrow shafts, that normally would decay when exposed on the surface. Additionally, aside from episodic habitational use, rock shelters are considered religious or spiritual resources that are extremely important to Native American cultures. Therefore, these resources meet the relevance criterion.

Open Lithic Scatters

The ACEC nomination expressed concern for surficial lithic scatters that may exist within the nominated ACEC, which possibly date to as early as the Archaic period, approximately 8000 to 10,000 B.C. (FNW 2023:9). The nomination specifically states that these sites would likely be located along pluvial lakes and playas within the nominated ACEC, which was corroborated by the site data containing a large quantity of open lithic scatters in proximity to pluvial lakes.

Eligible sites within the nominated ACEC comprise open lithic scatters and open habitation sites. Common throughout the Great Basin, the lithic scatters consist of mostly a surficial deposit, with no intact subsurface. Lithic scatters eligible for NRHP are usually nominated under Criterion D for scientific value based on diagnostic projectile points, which help determine local and regional chronologies, and the presence of obsidian artifacts for hydration dating and XRF sourcing analysis, which can help to determine possible prehistoric trade routes. Although lithic scatters were specifically mentioned by the ACEC nomination, they are generally common and are not particularly rare.

Relevance (No): Lithic scatters are numerous throughout the nominated ACEC, but they are generally ineligible for inclusion in the NRHP and are not considered to be a significant resource. Therefore, these sites do not meet the relevance criterion.

Open Habitation Sites

Open habitation sites were not specifically mentioned in the ACEC nomination, but they are well represented within the nominated ACEC. These sites are similar to open lithics in that they often contain surficial deposits of artifacts; however, they differ because they represent more permanent locations with a wide variety of residential activities taking place, instead of only late-stage tool reduction and maintenance from the small hunting-related camps. The artifact assemblages typically contain flaked stone, ceramics, and ground-stone tools for food production. It was common for eligible habitation sites within the nominated ACEC to contain rhyolite milling stones and hand stones. Additionally, rock features interpreted as rock circles or alignments were present during site recordation at several eligible sites within the nominated ACEC. The rocks composing the features were primarily locally sourced rhyolite and basalt cobbles. The purpose of these rock features is unknown because none of them were found with readily identifiable evidence of function such as FCR, charcoal, or other fire-related remains. Consultation with tribes has resulted in identification of functions for other similar rock features and is necessary for making accurate determinations of eligibility for this resource type. Impacts at sites of this type including artifact displacement and collection by collectors given the presence of piles of artifacts interpreted as collectors' piles left behind and not collected.

The surface expression of these sites may be minimal because of extensive collecting and the active aeolian depositional environment of lake valley bottoms within the Great Basin. Aeolian deposition primarily results in rolling sand dunes on pluvial lake margins, which are documented at several of these sites, or as a thick sheet of loess capping the older, likely Pleistocene age, landforms. As a result, the density and extent of sites in these types of depositional environments are not well understood and are likely extremely underreported. It then stands to reason that the visible surface capping the underlying archaeological may be too young for standard archaeological pedestrian surveys to be effective in accurately detecting sites (Young and Bullard 2019). Although most of the sites are speculative, based on the geomorphology of the valley bottoms within the nominated ACEC, it is highly likely that many habitation sites are buried and unrecorded along the margins of pluvial lake Tonopah and other similar dry valley-bottom lakes.

Relevance (Yes): Open habitation sites are numerous throughout the nominated ACEC. Additionally, open habitation sites, especially along pluvial lakes from the terminal Pleistocene/early Holocene, are poorly documented in this region and likely to contain a wide variety of artifact types and classes. In addition to the artifact assemblage, structural remains are likely to be found at deeply buried habitation sites such as those located in sand-dune environments and within areas containing deep veneers of loess. Additionally, these sites may be considered culturally and spiritually significant to tribes and could be eligible for inclusion in the NRHP under Criteria A or B for their important to Native American History. Therefore, habitation sites are considered a rare and sensitive site type and meet the relevance criterion.

3.1.1.1.4 Unrecorded Cultural Sites

Lastly, the ACEC nomination expressed concern for undocumented cultural sites that may exist within the nominated ACEC, but which are unrecorded because few archaeological surveys were conducted within the nominated ACEC (FNW 2023:9). To date, approximately 3.2 percent of the nominated ACEC has been covered by intensive (i.e., Class III) cultural resources surveys. Additionally, these surveys have identified 36 historic properties determined NHRP-eligible within the nominated ACEC boundary.

Relevance (No): Unrecorded cultural sites are listed as a resource type to highlight the fact that much of the nominated ACEC has not been subjected to intensive archaeological pedestrian survey. However, these are hypothetical resources that may or may not exist. Furthermore, until such resources are recorded and evaluated, there is no way to assess their relevance to the ACEC nomination. Therefore, these resources do not meet the relevance criterion.

3.1.2 Visual/Scenic Resources

Relevance (No): The BLM's Visual Resource Inventory (VRI) is a systematic process that the BLM uses to assess and rate the intrinsic scenic quality of land, measure the degree of public concern for the land (i.e., sensitivity level analysis), and classify the distance from which the landscape is typically viewed. Based on these three factors, land within the nominated ACEC is placed into one of four VRI classes (i.e., VRI Class I through Class IV). VRI Class I lands have the greatest relative visual value, and Class IV lands have the lowest relative visual value. Class I designations are reserved for special areas, where the current management situations require maintaining a natural environment essentially unaltered by humans. This class is typically only given by administrative assignment for highly sensitive and scenic areas, including National Wilderness Areas, National Wild and Scenic Rivers, and other significant landscapes. All other VRI classifications (i.e., Classes II, III, and IV) are determined through the individual scores from each category, which are then used in conjunction with a matrix that weighs each category (BLM 1986). In the nominated ACEC, a majority of the nominated ACEC is rated as VRI Class III (381,007 acres), followed by Class IV (306,474 acres) and Class II (126,481 acres) (BLM 2022). Only 35,194 acres, or approximately 4 percent, of the nominated ACEC is rated as VRI Class I; these acres are primarily located within the existing Silver Peak WSA and Pinyon Joshua Instant Study Area (Figure 2).

Within the VRI process, the BLM evaluates public lands with regard to their scenic quality, defined as the visual appeal of a particular tract of land. The BLM divides the landscape into Scenic Quality Rating Units based on changes in physiography or land use, and ranks the scenic quality within each unit based on the assessment of landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Scenic value rating A is considered to have high scenic value, B has moderate scenic value, and C has low scenic value. Within the nominated ACEC, 474,425 acres (56 percent) were assigned a scenic value rating of B and 374,732 acres (44 percent) were assigned a scenic value rating of C (Figure 3). No high value (scenic value rating A) were identified within the nominated ACEC.

The BLM assigns Visual Resource Management (VRM) classes through RMPs, and all actions resulting in surface disturbance must consider the importance of the visual values and the impacts that the project may have on these values. The majority of the nominated ACEC is currently designated as VRM Class IV (750,035 acres, or approximately 88 percent of the nominated ACEC) (Figure 4; BLM 2007). The existing Silver Peak WSA and Pinyon Joshua Instant Study Area are the only areas designated as Class I VRM (35,181 acres). VRM Class II comprises 28,541 acres and Class III comprises 35,383 acres of the nominated ACEC. Based on the BLM VRI and VRM, the nominated ACEC outside of the Silver Peak WSA and Pinyon Joshua Instant Study Area does not meet the relevance criterion for visual/scenic resources.

Figure 2. Visual Resource Inventory Classes within the Nominated Esmeralda/Fish Lake ACEC

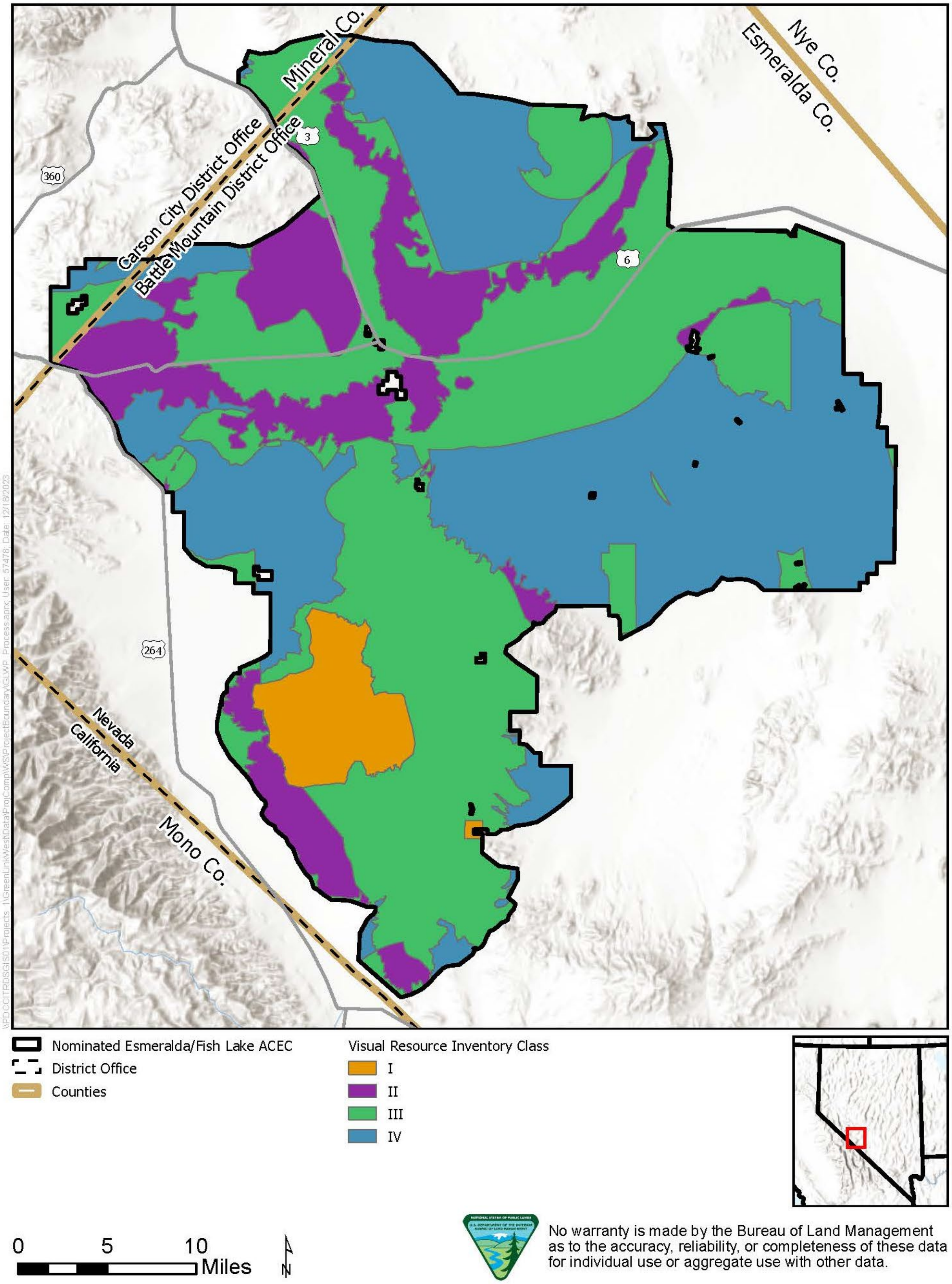


Figure 3. Scenic Quality Rating within the Nominated Esmeralda/Fish Lake ACEC

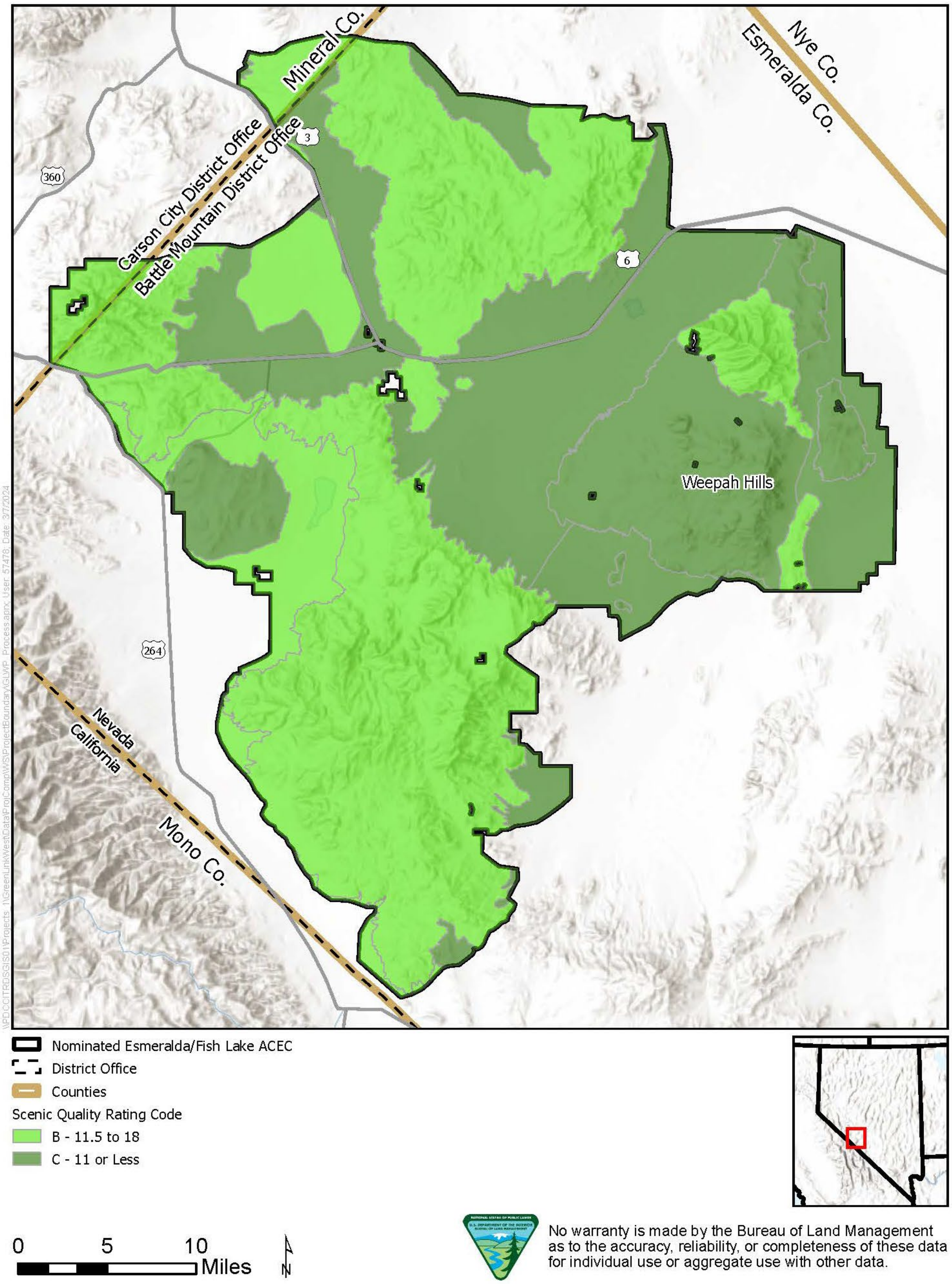
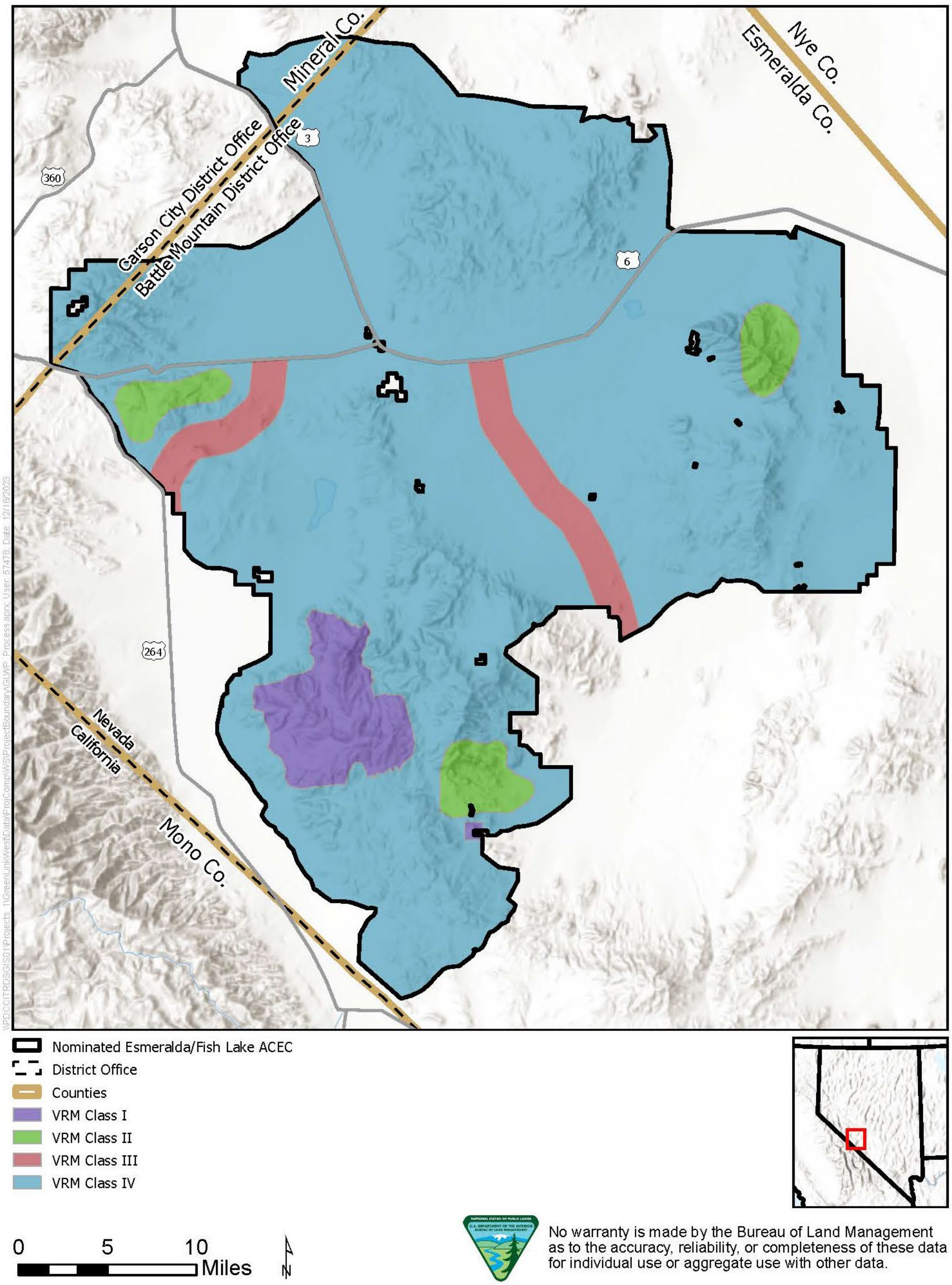


Figure 4. Visual Resource Management Classes within the Nominated Esmeralda/Fish Lake ACEC



No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data.

3.2 Fish and Wildlife Resources (Relevance Criterion 2)

Relevance (Yes): The ACEC nomination discussed the variety of wildlife habitat available that includes the transition zone between the Mojave Desert and the high desert of the Great Basin. Wildlife mentioned in the ACEC nomination includes bighorn sheep (*Ovis canadensis*), greater sage-grouse (*Centrocercus urophasianus*), and mountain lion (*Puma concolor*), in addition to noting the vertebrate species richness in Fish Lake Valley and the Esmeralda area (FNW 2023:1, 13–15). The various upland vegetation communities, riparian habitat, seeps and springs, and wetlands, and varied elevations within the ACEC provide habitat for a variety of terrestrial and aquatic wildlife species, including big-game species, nongame and small-mammal species, birds, reptiles, amphibians, fish, gastropods, and insects, including special status species. Habitat requirements for a given species determine their distribution and abundance within the ACEC; some more generalist species may be widely distributed or occur in many different vegetation communities while more specialist species may be restricted to smaller or specific areas. As noted in the nomination, important natural water sources for various animals are found in several areas, including the Silver Peak Range, Rhyolite Ridge, Lone Mountain, Monte Cristo Valley, Devil's Gate, and Gap Springs areas (FNW 2023:13), in addition to Columbus Salt Marsh Valley and ephemeral sources. Refer to Section 3.3.3, *Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs*, for more information regarding these aquatic habitat types. The nominated ACEC area also contains management units for game species, including bighorn sheep, mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*).

Appendix A lists special status wildlife species that may occur within the nominated ACEC and include the following:

- Species federally listed as Threatened, Endangered, or Candidate species under the authority of the Endangered Species Act of 1973 (ESA). The BLM must manage for the recovery of Threatened and Endangered species, and the ecosystems on which they depend, and consult with the U.S. Fish and Wildlife Service (USFWS) if a proposed activity may affect the population or habitat of a listed species.
- BLM Sensitive Species are designated by the BLM State Director as requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. All federal Candidate, Proposed, and delisted species in the 5 years following delisting are conserved as BLM Sensitive Species (BLM 2023a).
- U.S. Forest Service Sensitive species.
- Nevada Department of Wildlife (NDOW) – State of Nevada Protection and Designations.

The species list in Appendix A was compiled from a USFWS Information for Planning and Consultation (IPaC) report for the nominated ACEC area (USFWS 2023) and from the *Final Nevada BLM Special Status Species List* (BLM 2023a) for the Carson City and Battle Mountain BLM District areas.

Eighteen species listed under the ESA, or Proposed, Candidate, or under review, have been documented or have the potential to occur within the nominated ACEC; no federal critical habitat designations for Endangered or Threatened wildlife species occur within the nominated ACEC boundary. Because the majority of the proposed ACEC is within the Carson City BLM District, many of the species occurrences and ranges documented within the Battle Mountain BLM District in Appendix A may be outside of the nominated ACEC boundary. A summary of special status species potentially occurring in the nominated ACEC is presented in Table 3-1. Because of the occurrence of fish and wildlife and special status species in the nominated ACEC area, this resource meets the relevance criterion.

Table 3-1. Summary of Special Status Species Potentially Occurring in the Nominated ACEC by Listing Jurisdiction*

Group	USFWS – ESA Listed or Proposed	BLM – Sensitive and Special Status	U.S. Forest Service – Sensitive	State of Nevada – Sensitive
Amphibians	2	6	0	3
Birds	4	29	5	10
Fish	6	14	5	2
Mammals	0	34	6	20
Reptiles	1	10	1	1
Insects	3	26	0	0
Mollusks	1	14	0	0
Total	**17**	**133**	**17**	**36**

Source: USFWS 2023; BLM 2023a.
*A given species may be listed by one or more of the above state and federal entities; therefore, rows should not be summed.
ACEC = Areas of Critical Environmental Concern; BLM = Bureau of Land Management; ESA – Endangered Species Act; USFWS = U.S. Fish and Wildlife Service.

3.2.1 Endangered Species Act-Listed Aquatic Species Reviewed within the Nominated ACEC

Sixteen special status fish species occurred on the *Final BLM Nevada Sensitive and Special Species Status List* (BLM 2023a) for the Carson City and Battle Mountain BLM District areas, including the federally listed Cui-ui sucker, Hiko White River springfish, Lahontan cutthroat trout, Moapa dace, and Railroad Valley springfish.

Cui-ui (*Chasmistes cujus*), listed as federally Endangered in 1967 and listed as Endangered in Nevada, is a large, plankton-feeding, lake-dwelling fish endemic to Pyramid Lake, Nevada; it ascends the Truckee River to spawn. Critical habitat has not been designated for the species. Cui-ui is culturally significant to the Pyramid Lake Paiute Tribe. Historical habitat included the Truckee River from Hunter Creek (western Reno) downstream to and including Pyramid Lake and its tributaries outside the boundary of the nominated ACEC.

Hiko White River springfish (*Crenichthys baileyi grandis*) was listed as federally Endangered in 1985 and Endangered in Nevada in 1998. Hiko White River springfish is restricted to three aquatic systems: Crystal Springs, Hiko Spring, and Blue Link Spring (USFWS 2022a). They are native to Hiko and Crystal Springs, while Blue Link Spring serves as a refuge population outside the historic range of the species; all are outside the boundary of the nominated ACEC.

Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*) was listed as federally Threatened in 1970 and is listed as Threatened in Nevada. The Lahontan cutthroat trout occurs in coldwater habitats, including alkaline and alpines lakes and rivers, and is endemic to the Lahontan Basin of northern Nevada, eastern California, and southern Oregon. Three primary counties in Nevada contain streams where Lahontan cutthroat trout concentrate: Elko, Humboldt, and Nye. It currently is found in five historic lakes, including Pyramid, Walker, Fallen Leaf, Independence, and Summit lakes, which are outside the boundary of the nominated ACEC.

Moapa dace (*Moapa coriacea*) was listed as federally Endangered and is endemic to approximately 6 miles of stream habitat in the upper Muddy River in the Warm Springs area of Clark County, Nevada, outside the boundary of the nominated ACEC.

Railroad Valley springfish (*Crenichthys nevadae*) was listed as federally Threatened in 1986 and is listed as Threatened in Nevada. The Railroad Valley springfish occurs in thermal spring habitats and is endemic to six thermal spring systems in Railroad Valley, Nye County, Nevada, all of which are outside the boundary of the nominated ACEC.

3.2.2 Endangered Species Act-Listed Amphibians and Reptiles Species Reviewed within the Nominated ACEC

Dixie Valley toad (*Anaxyrus williamsi*) was emergency listed as federally Threatened in 2022. It is endemic to Nevada, with a range restricted to a 760-acre wetland complex fed by hot springs in the remote Dixie Valley, northeast of Fallon, Nevada, outside the boundary of the nominated ACEC.

Sierra Nevada yellow-legged frog (*Rana sierrae*) was listed as federally Threatened in 2014 and is associated with rocky streambeds and wet meadows surrounded by coniferous forest. The majority of the species' range is in California; historical records indicate that it also occurred within the Carson Range of Nevada, including Mount Rose in Washoe County, and also occurred in the vicinity of Lake Tahoe in Douglas County, Nevada. The current range is restricted primarily to high-elevation publicly managed lands, including streams, lakes, ponds, and meadow wetlands, located within National Forests and National Parks in California and western Nevada, immediately north of Lake Tahoe and outside the boundary of the nominated ACEC.

3.2.3 Endangered Species Act-Listed Mammal Species Reviewed within the Nominated ACEC

No mammal species are currently listed under the federal ESA occur in the nominated ACEC boundary.

3.2.4 Endangered Species Act-Listed or Proposed for Listing Bird Species Reviewed within the Nominated ACEC

Greater sage-grouse is an obligate species of large expanses of open sagebrush and is dependent on this ecosystem for nesting, breeding, rearing young, and over wintering. The Bi-State sage-grouse Distinct Population Segment (DPS) is restricted to northern Pine Nuts in Nevada through the southern extent of Pine Nuts and continues across Bodie Hills to the White Mountains and California (USFWS 2020a); it was proposed for ESA listing as Threatened on April 27, 2023. A portion of the ACEC is within the White Mountains Population Management Unit, and proposed critical habitat is situated on White Mountain within the nominated ACEC (USFWS 2013). A detailed description of the species and Bi-state sage-grouse can be found in the *Species Report* (USFWS 2020a). BLM manages the Bi-state sage-grouse through the 2016 *Record of Decision and the Land Use Plan Amendment for the Nevada and California Greater Sage-Grouse Bi-State District Population Segment in the Carson City District and Tonopah Field Offices* (BLM 2016a).

The Bi-state sage-grouse has limited potential to occur in the nominated ACEC boundary. Greater sage-grouse from the remainder of the state are listed as BLM Sensitive Species and are managed through the *Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region* (BLM 2015). The nominated ACEC area is outside of designated Habitat Management Areas for greater sage-grouse (BLM 2015).

Ridgway's rail (i.e., Yuma clapper rail [*Rallus longirostris yumanens*]**)** is listed as federally Endangered; it is a secretive marsh bird that generally occurs in freshwater and alkali marshes dominated by emergent wetland vegetation. In Nevada, they are resident along the Colorado River and its tributaries, which are outside the boundary of the nominated ACEC (NDOW 2012).

Two federally listed riparian-associated migrant songbirds occur in southern Nevada. **Southwestern willow flycatcher** (*Empidonax traillii extimus*) is a neotropical migrant songbird that, in Nevada, is restricted to willow or tamarisk habitats in saturated soils in southern Nevada on tributaries to the Colorado River (NDOW 2012). **Yellow-billed cuckoo** (*Coccyzus americanus*) requires dense cottonwood–willow riparian forest tracts and is only known from a few localities in Nevada (NDOW 2012). Although these species could migrate through the nominated ACEC, the nominated ACEC lacks suitable perennial-water and well-developed riparian habitat for breeding and nesting, and neither species is known to nest within in the nominated ACEC boundary.

3.2.5 Endangered Species Act-Listed Insect Species Reviewed within the Nominated ACEC

Carson wandering skipper (*Pseudocopaeodes eunus obscurus*) is listed as federally Endangered. It is a small butterfly with three remaining populations that occur outside of Carson City, Nevada, outside the boundary of the nominated ACEC. It occurs in lowland grassland habitats on alkaline substrates (USFWS 2007).

Monarch butterfly (*Danaus plexippus*) is a Candidate species for federal listing and may occur throughout the nominated ACEC boundary during migration. Monarchs are dependent on milkweed (*Asclepias* sp.) as a host plant for summer larval breeding and wildflowers for summer nectaring habitat. Monarchs are not known to overwinter in the nominated ACEC area. Although monarch larvae are host-plant specialists, adult monarchs are nectar generalists that feed on a variety of flowering plants (Brower et al. 2006). Nectar plants and milkweed are important for monarch survival; in western North America, nectar and milkweed resources are often associated with riparian corridors. Although milkweed species are often more concentrated in mesic areas or riparian floodplains (USFWS 2020b), various milkweeds can be found throughout the deserts and sagebrush communities where adequate ground water persists within the nominated ACEC area.

3.3 Natural Processes or Systems (Relevance Criterion 3)

3.3.1 Vegetation Resources

Relevance (Yes): The ACEC nomination mentioned extensive areas of desert and desert mountain habitats that provide connectivity across biogeographic regions and elevational gradients (FNW 2023:1, 7, 19). The area contains a mosaic of desert vegetation types that covers 5,000 feet of elevation change, from playas and alluvial fans, to extensive stands of cactus species and desert shrublands, to high-elevation conifer forests. Although surface water flows are absent, there are areas of alkaline marsh and scattered seeps and springs in the nominated ACEC.

Review of vegetation-type mapping data from the Nevada Natural Heritage Program revealed that 40 vegetation types have been mapped and identified in the nominated ACEC (NNHP 2008). The broad vegetation classes (i.e., habitat type) are shown on Figure 5, and the vegetation types are listed in Table 3-2. Most of these vegetation types are aggregations of vegetation types and have not been assessed for global rarity—this assessment is performed at lower levels in the vegetation classification hierarchy. Of the few vegetation types in Table 3-2 that have been assessed, the following are considered rare and ranked G3 (Vulnerable): Intermountain Basins Big Sagebrush Steppe, *Allenrolfea Occidentalis* Shrubland, and Mojave Mid-Elevation Mixed Desert Scrub. Therefore, this resource meets the relevance criterion.

Figure 5. Habitat Types in the Nominated Esmeralda/Fish Lake ACEC

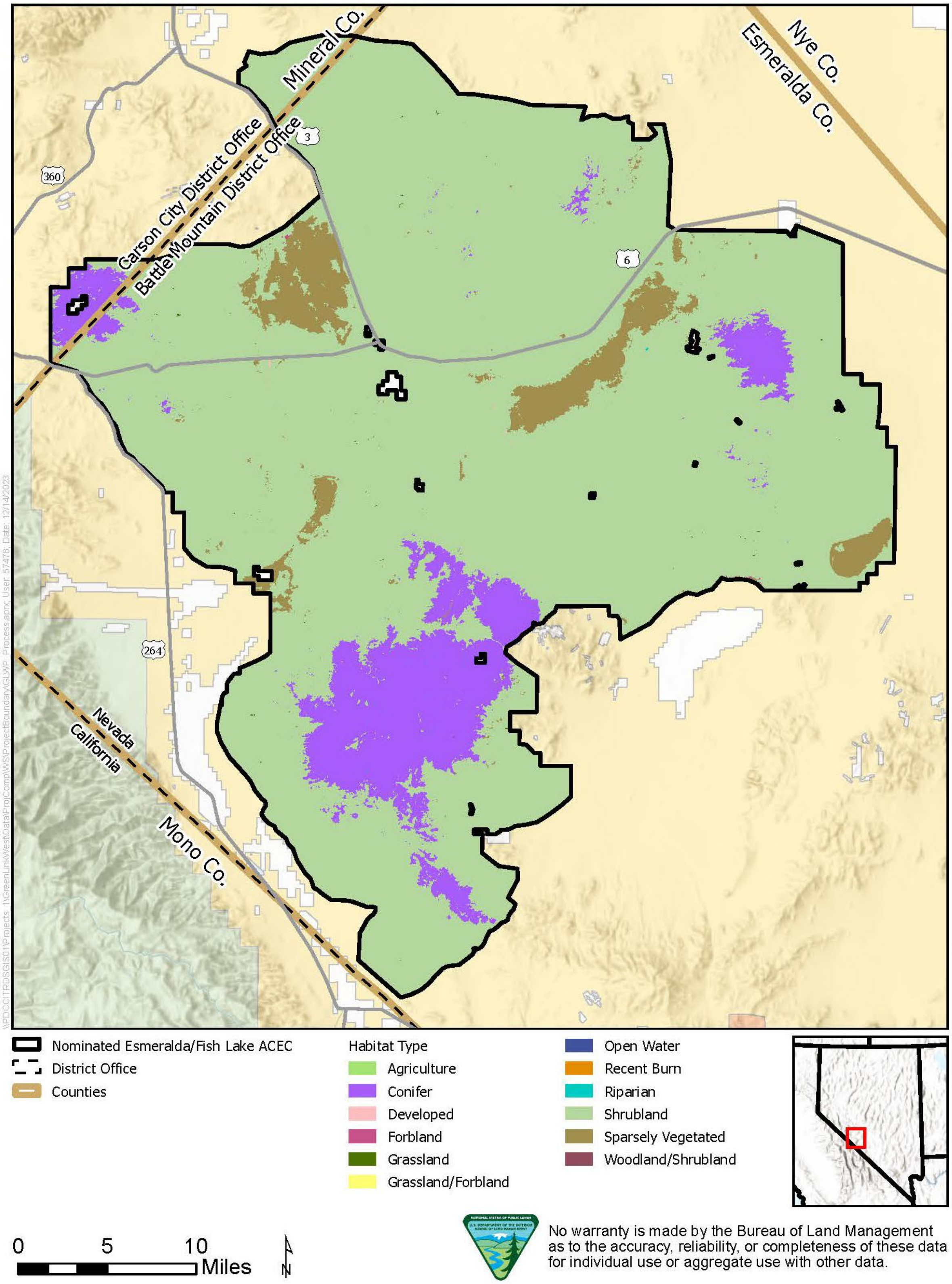


Table 3-2. Vegetation Types Mapped in the Nominated ACEC

Vegetation Type	Habitat Type	Acres
Columbia Plateau Low Sagebrush Steppe	Shrubland	<1
Developed–Low Intensity	Developed	751
Developed–Medium Intensity	Developed	188
Great Basin Pinyon–Juniper Woodland	Conifer	77,133
Great Basin Xeric Mixed Sagebrush Shrubland	Shrubland	63,487
Intermountain Basins Active and Stabilized Dune	Sparsely Vegetated	400
Intermountain Basins Big Sagebrush Shrubland	Shrubland	13,774
Intermountain Basins Big Sagebrush Steppe	Shrubland	41
Intermountain Basins Greasewood Flat	Shrubland	36,988
Intermountain Basins Mixed Salt Desert Scrub	Shrubland	484,746
Intermountain Basins Montane Sagebrush Steppe	Shrubland	179
Intermountain Basins Semi-Desert Grassland	Grassland	164
Intermountain Basins Semi-Desert Shrub-Steppe	Shrubland	23,878
Intermountain Basins Subalpine Limber–Bristlecone Pine Woodland	Conifer	763
Mojave Mid-Elevation Mixed Desert Scrub	Shrubland	6,606
North American Arid West Emergent Marsh	Riparian	30
Sierra Nevada Subalpine Lodgepole Pine Forest and Woodland	Conifer	<1
Agriculture–Pasture/Hay	Agriculture	79
Allenrolfea Occidentalis Shrubland	Shrubland	<1
Artemisia (*arbuscula, tridentata* ssp. *vaseyana*)	Shrubland	35
Artemisia (*arbuscula, tridentata* ssp. *wyomingensis*)	Shrubland	970
Artemisia arbuscula	Shrubland	13
Artemisia Nova Shrubland Alliance	Shrubland	81,544
Artemisia Tridentata ssp. (*Tridentata, Wyomingensis*)	Shrubland	6,864
Artemisia Tridentata ssp. *Vaseyana* Shrubland Alliance	Shrubland	4,769
Developed–Open Space	Developed	1,783
Distichlis Spicata Herbaceous Vegetation	Grassland	<1
Grayia Spinosa Shrubland Alliance	Shrubland	272
Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland	Woodland/Shrubland	19
Intermountain Basins Curl-Leaf Mountain Mahogany Woodland and Shrubland	Woodland/Shrubland	52
Intermountain Basins Montane Riparian Systems	Riparian	2,774
Intermountain Basins Sparsely Vegetated Systems	Sparsely Vegetated	957
Introduced Upland Vegetation–Annual and Biennial Forbland	Forbland	476
Introduced Upland Vegetation–Annual Grassland	Grassland	272
Introduced Upland Vegetation–Perennial Grassland and Forbland	Grassland/Forbland	12
Microphytic Playa Sparse Vegetation [provisional]	Sparsely Vegetated	38,996
Open Water or Aquatic Vegetation	Open Water	<1
Recent Burn	Recent Burn	3
Rocky Mountain Alpine/Montane Sparsely Vegetated Systems	Sparsely Vegetated	44
Sarcobatus Baileyi – Picrothamnus Desertorum (*Atriplex confertifolia*)/ (*Pleuraphis jamesii*) Shrubland	Shrubland	<1

Sources: NNHP 2008; BLM 2023b.

3.3.2 Plant Resources

Relevance (Yes): Special status plant species that may occur within the nominated ACEC are listed in Appendix A. Special status plants are defined as the following.

- Species federally listed as Threatened, Endangered, or Candidate species under the authority of the ESA. The BLM must manage for the recovery of Threatened and Endangered species and the ecosystems on which they depend and consult with the USFWS if a proposed activity may affect the population or habitat of a listed species.
- BLM Sensitive Species, which are species designated by the BLM State Director as requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. All federal Candidate, Proposed, and delisted species in the 5 years following delisting are conserved as BLM Sensitive Species.

The species list in Appendix A was compiled from the USFWS IPaC report for the nominated ACEC area (USFWS 2023) and from the current *Nevada BLM Special Species Status List* (BLM 2023a) for the Carson City and Battle Mountain BLM District areas. The list includes 91 plant species, six of which are listed under the ESA, and one additional species has recently been petitioned for listing.

Only one species listed under the ESA, Tiehm's buckwheat (*Eriogonum tiehmii*), is known to occur within the nominated ACEC. Critical habitat has been designated for Tiehm's buckwheat, covering approximately 910 acres in one unit. An additional species that occurs in the nominated ACEC, Tecopa bird's beak, also known as Tecopa salty bird's-beak (*Cordylanthus tecopensis*), was petitioned for listing in September 2023. With the occurrence of these species in the nominated ACEC, this resource meets the relevance criterion.

3.3.2.1 Tiehm's Buckwheat

Tiehm's buckwheat was petitioned to be emergency listed in 2019 in response to threats from mining. It was federally listed as Endangered on December 14, 2022 (USFWS 2022b). It is also a BLM Sensitive Species.

Tiehm's buckwheat was discovered in 1983 and described in 1985 (Reveal 1985). It is a mat-forming perennial herb with grayish leaves that produces heads of small, pale-yellow flowers in May and June. Seeds appear to lack adaptations for effective dispersal and likely do not move far from the source plant.

Tiehm's buckwheat is a very narrow endemic known from only one population covering about 10 acres in the Rhyolite Ridge area of the Silver Peak Range in Esmeralda County, Nevada. All occurrences are on BLM-administered lands. It is confined to, and adapted to grow in, a specific soil type; these soils are found on barren open slopes and are derived from an uncommon formation of interbedded clay stones, shales, tuffaceous sandstones, and limestones. The soils are challenging for plant life—they are alkaline with very high levels of carbonates, calcium, and boron, high levels of sulfur and potassium, and low levels of phosphorus and nitrogen.

The primary threats to Tiehm's buckwheat are mineral exploration and development, road development and off-highway vehicle (OHV) use, livestock grazing, nonnative invasive plant species, herbivory, and climate change (USFWS 2021).

3.3.2.2 Tecopa Bird's Beak

Tecopa bird's beak has been petitioned for listing—the petition was received on September 26, 2023—and USFWS has 90 days to respond. A BLM Sensitive Species, Tecopa bird's beak is a small, hemiparasitic annual herb that flowers from late May to early November. It grows in alkali meadows sustained by shallow groundwater associated with deeper alkali groundwater surrounded by desert. Tecopa bird's beak is known from only 10 occurrences in two alkali meadow complexes in the Amargosa River Basin in Nye County, Nevada, and Inyo County, California, in eastern California and western Nevada, and in Fish Lake Valley in Esmeralda County, Nevada.

Threats identified by the Center for Biological Diversity (2023) to this species include over appropriation and drawdown of groundwater from urban, agricultural, and geothermal developments, mining activity, grazing, and OHVs (Center for Biological Diversity 2023).

3.3.3 Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs

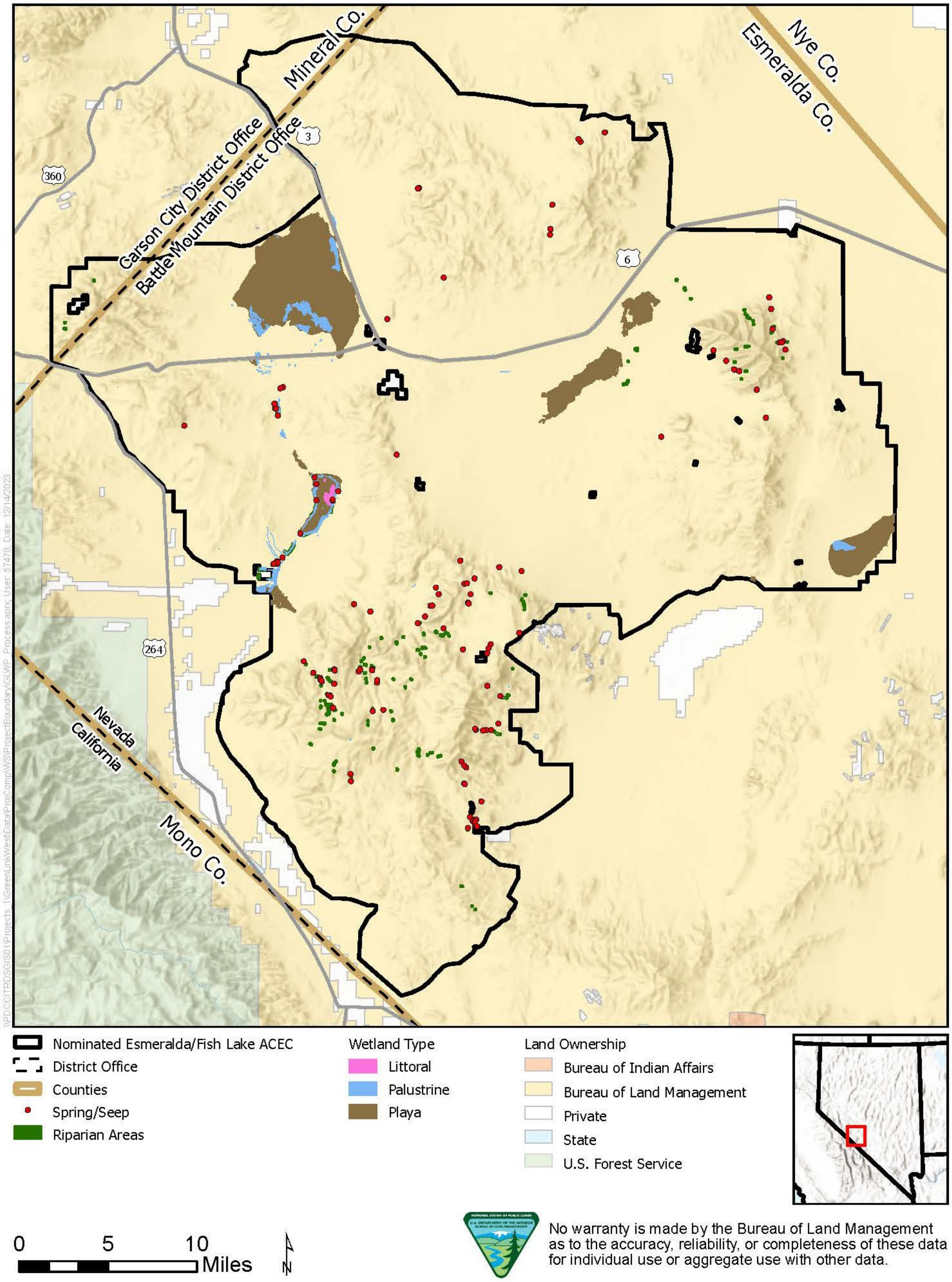
Relevance (Yes): The ACEC nomination mentioned watersheds, important springs and aquifers, playas, sensitive soils, and regional springs (FNW 2023:1). The nominated ACEC lies within portions of the Fish Lake–Soda Springs, Southern Big Smoky, and Ralston–Stone Cabin valley watersheds (Hydrologic Unit Codes 16060010, 16060003, and 16060011, respectively) (USGS 2023). All three watersheds are part of the Central Hydrographic Region, as defined by the Nevada Division of Water Resources. The Central Hydrographic Region is characterized by the absence of regional surface-water flows, groundwater basins that are often interconnected by subsurface flow, deep bedrock aquifers, and some productive alluvial aquifers (CNRWA 2023).

Review of the Natural Resources Conservation Service's Soil Survey Geographic Database revealed 187 soil units within the nominated ACEC (NRCS 2023). Soils within the nominated ACEC are somewhat varied, with alluvium occurring in valleys and playas present at lower elevations in closed basins; however, the dominant mapped soil units are consistent with soils found throughout the broader Southern Nevada Basin and Range Major Land Resource Region (Blackburn et al. 2021). The most extensive soil orders within the nominated ACEC and the larger Southern Nevada Basin and Range Major Land Resource Region are entisols and aridisols (NRCS 2023; Blackburn et al. 2021). *Entisols* are the least developed soils in Nevada (i.e., they are poorly developed soils with little to no structure). By definition, *aridisols* have an aridic soil-moisture regime (Blackburn et al. 2021). Generally, entisols and aridisols in the region have relatively low wind- and water-erosion potential.

Sensitive soils in the nominated ACEC include wetland and riparian soils and biological soil crusts. Biological soil crusts, also referred to as *cryptobiotic soils*, occur on undisturbed soils in arid or semiarid regions. Although biological soil crusts have not been surveyed on BLM-administered lands within the nominated ACEC, they may be present based on soil types and climate characteristic of the region.

Wetlands and riparian areas represent 34,826 acres (4.1 percent) and 449 acres (less than 0.01 percent) of the nominated ACEC, respectively (McGwire 2019; Saito et al. 2020) (Figure 6). Of the wetlands mapped within the nominated ACEC, the majority (31,404 acres) are classified as playas. Playas mapped in the nominated ACEC are classified as intermittently flooded (19,843 acres), seasonally flooded (10,760 acres), or dry (800 acres). Because of the region's general lack of perennial surface-water flows, these areas and their sensitive soils are primarily confined to a few low-elevation closed basins in western and eastern portions of the nominated ACEC (i.e., Big Smoky Valley, Fish Lake Valley, and Columbus Salt Marsh). Alkali Lake, in the far eastern portion of the nominated ACEC, is also mapped as a playa. The limited extent of riparian areas, seeps, and springs is primarily confined to Lone Mountain, Rhyolite Ridge, Sheep Mountain Lands with Wilderness Characteristics Unit, and the Silver Peak WSA (Figure 6). With the occurrence of these resources in the nominated ACEC area, this resource meets the relevance criterion.

Figure 6. Wetlands, Riparian Areas, Seeps, and Springs within the Nominated Esmeralda/Fish Lake ACEC



Note: Littoral wetlands are buffered by 250 feet for visibility on the figure.

3.3.4 Paleontological Resources

Relevance (Yes): The ACEC nomination mentioned paleontological resources within Lone Valley, Tonopah Flat, Gabbs Valley, The Sump, and the southern Volcanic Hills (FNW 2023:5). As noted in the nomination, the entire uplands of The Sump comprise late-Miocene volcaniclastic deposits, sediments that are rich in plant and animal fossils. Petrified wood from extinct variations of redwood and oak is common throughout the formation, and fossils collected from The Sump include extinct moles and shrews, insectivores, two extinct rabbit species, rodents, and an extinct beaver. The Sump has an outstanding formation, exhibiting a paleo-forest, and several *Gomphothere* specimens (an extinct relative of elephants) have been collected from the volcanic formation in The Sump (FNW 2023:141). Additionally, The Sump is an important area for rock-hounding and is known to contain petrified wood, chalcedony, and opal.

The Potential Fossil Yield Classification (PFYC) system allows the BLM to make initial assessments of paleontological resources in order to plan for multiple uses of public lands, consider disposal or acquisition of lands, analyze potential effects of a proposed action under NEPA, or conduct other BLM resource-related activities (BLM 2016b). Occurrences of paleontological resources are known to be correlated with mapped geologic units (i.e., formations). The PFYC was created from available geologic maps and assigns a class value to each geological unit, representing the potential abundance and significance of paleontological resources that occur in that geological unit. PFYC assignments should be considered as only a first approximation of the potential presence of paleontological resources, subject to change based on ground verification (BLM 2016b). The descriptions for the PFYC class assignments and the acreage of each PFYC class within the nominated ACEC are provided in Table 3-3. The descriptions for the PFYC class assignments in Table 3-3 serve as guidelines, rather than as strict definitions. PFYC class assignments within the nominated ACEC are shown on Figure 7.

The majority of the nominated ACEC (422,056 acres, or 50 percent of the nominated ACEC) is classified as having low paleontological potential (PFYC 2), followed by very low potential in PFYC 1 (194,580 acres, or 23 percent), and unknown potential in PFYC U (103,133 acres or 12 percent) (Table 3-3). PFYC 4 (high potential) and PFYC 3 (moderate potential) account for approximately 71,486 acres, or 8 percent, and 57,867 acres, or 7 percent, of the nominated ACEC, respectively. No areas within the nominated ACEC are classified as having very high (PFYC 5) paleontological potential. The limited amount of unknown paleontological potential (PFYC U) can be found throughout the nominated ACEC, and generally underlay mountainous regions, including the vicinity of Weepah Hills and the south- and west-central portions of the nominated ACEC (Figure 7). Geologic units with unknown paleontological potential (i.e., PFYC U) are given medium to high management concerns for various reasons, including a lack of information about the actual paleontological resources for the geological unit, and because BLM staff has not yet been able to assess the nature of the geologic unit (BLM 2016b). Geologic units with high paleontological potential (PFYC 4) primarily occur within the northern portion of the nominated ACEC, although smaller pockets are also mapped in the eastern, central, and southern portions of the nominated ACEC (Figure 7). With areas having moderate to high and unknown potential in the nominated ACEC, this resource meets the relevance criterion.

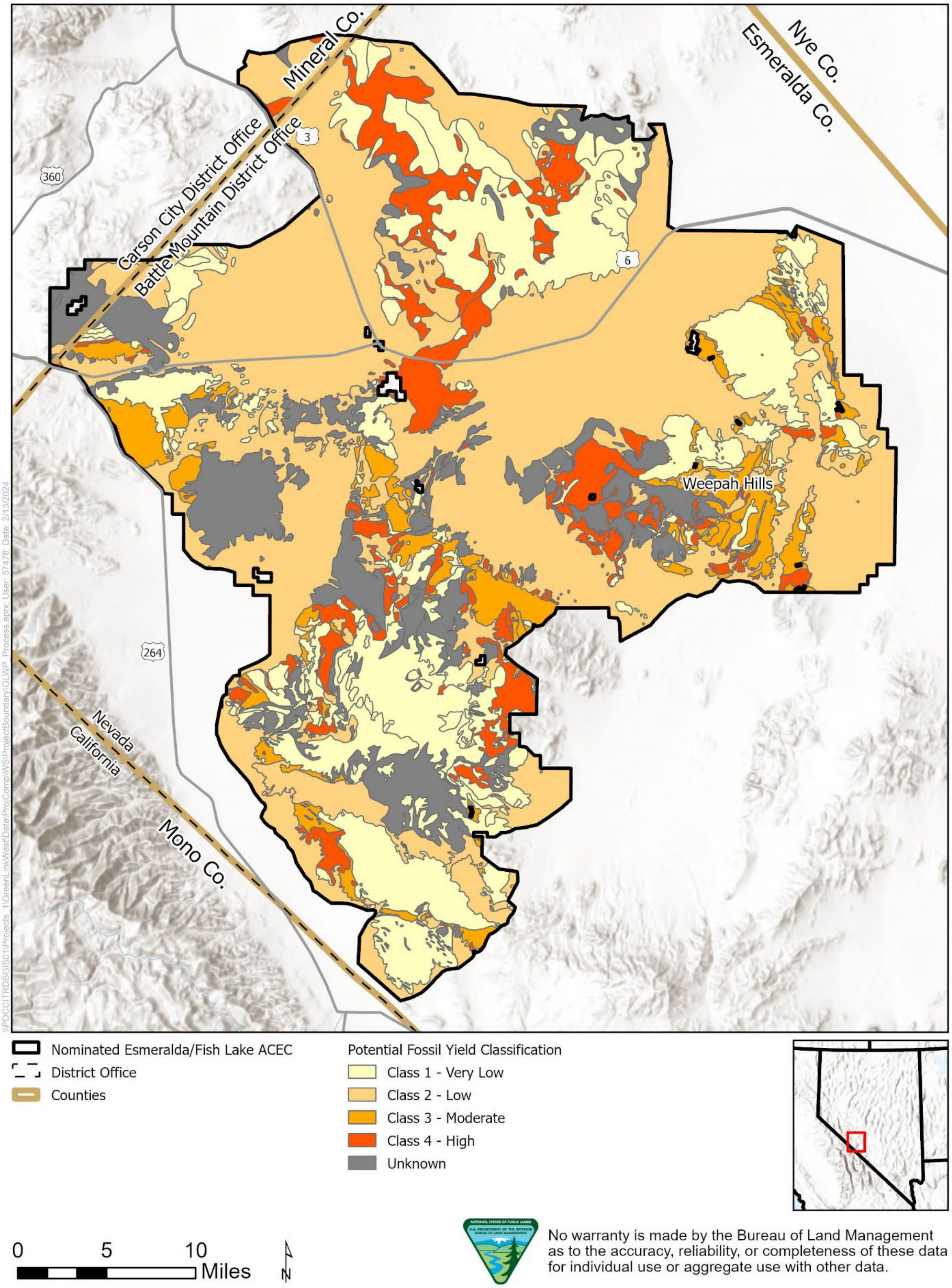
Table 3-3. Potential Fossil Yield Classification Descriptions and Acreages for Each Class within the Nominated ACEC

PFYC Class	Definition	Management Concerns and Mitigation	Acres
Class 1 (Very Low)	Geologic units that are not likely to contain recognizable paleontological resources.	• Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable. • Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. • Standard stipulations should be put in place prior to authorizing any land use action to accommodate an unanticipated discovery.	194,580
Class 2 (Low)	Geologic units that are not likely to contain paleontological resources	• Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low, and further assessment is usually unnecessary except in occasional or isolated circumstances. • Paleontological mitigation is only necessary where paleontological resources are known or found to exist. • Localities containing important paleontological resources may exist, but are occasional and should be managed on a case-by-case basis. • Standard stipulations should be put in place prior to authorizing any land use action to accommodate unanticipated discoveries.	422,056
Class 3 (Moderate)	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence	• Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting. • Paleontological mitigation strategies would be proposed based on the nature of the proposed activity. • Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action and whether the action could affect the paleontological resources.	57,868

PFYC Class	Definition	Management Concerns and Mitigation	Acres
Class 4 (High)	Geologic units that are known to contain a high occurrence of paleontological resources	• Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action. • Paleontological mitigation strategies would depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions. • Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required, and onsite monitoring or spot-checking may be necessary during land-disturbing activities. In some cases, avoidance of known paleontological resources may be necessary.	71,486
Class 5 (Very High)	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources	• Management concerns for paleontological resources in Class 5 areas are high to very high. • A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface disturbing activities. • The area should be assessed prior to land-tenure adjustments. Prework surveys are usually needed, and onsite monitoring may be necessary during land-use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.	0
Class U (Unknown Potential)	Geologic units that cannot receive an informed PFYC assignment	• 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.	103,133

Sources: BLM 2016b, 2023b

Figure 7. Potential Fossil Yield Classification within the Nominated Esmeralda/Fish Lake ACEC



3.4 Natural Hazards (Relevance Criterion 4)

Relevance (No): The ACEC nomination did not identify natural hazards within the nominated area. The BLM determined that natural hazards were not a significant consideration in this area.

4.0 DETERMINATION OF IMPORTANCE

This section identifies each Importance Criterion, assesses the values of the nominated ACEC, indicates whether the Importance Criteria were met, and includes a justification for those determinations.

4.1 More Than Local Significance (Importance Criterion 1)

4.1.1 Cultural Resources

4.1.1.1 Historic Sites

See Section 3.1.1, *Cultural Resources*, for a detailed description of historic archaeological sites.

4.1.1.1.1 Mineral Ridge Historic Mining District

Importance (Yes): The property was NHRP-listed in 1995 for its significance under Criteria A, C, and D (Zeier 1996). These criterions include properties that are

> "associated with events that have made a significant contribution to the broad patterns of our history; and embody the distinctive characteristics of a type, period, or method of construction that represent the work of a master; and have yielded, or may be likely to yield, information important in prehistory or history (U.S. Department of the Interior, National Park Service, NRHP Registration Form 10-900)."

The MRHMD was recommended NRHP-Eligible because it possesses a connectedness to mining and mining-related activities in Nevada on the state level (Zeier 1996). Therefore, this site retains more than local significance and meets the Importance Criterion 1.

4.1.1.1.2 Pacific Borax Works

Importance (No): Borax works were not unique throughout southwestern Nevada during this time period, and this site retains very little integrity, rendering it eligible for inclusion in the NRHP.

Therefore, this site does not meet Importance Criterion 1.

4.1.1.2 Prehistoric Sites

See Section 3.1.1, *Cultural Resources*, for a detailed description of prehistoric archaeological site types.

4.1.1.2.1 Cave Spring

Importance (Yes): The geospatial distribution of rock writing sites in the Great Basin and the emerging patterns and relationships between sites across the region may yield insights into the prehistoric cultures that produced them (Castleton and Madsen 1981). Although direct dating of rock writing via radiometric dating is almost impossible, relative dating can be used to date individual sites and is made more accurate with a wide variety of sites to analyze in order to exclude outliers. The panels at Cave Spring specifically feature a panel that contains Great Basin painted pictographs pecked with superimposed Great Basin–painted pictographs, suggesting that the production of rock writing at this site had several episodes over time. This site not only contains more than local significance for its potential scientific value, but also cultural association for the Timbisha Shoshone, for whom this site is a sacred cultural place, thus emphasizing the more-than-local significance for their culture. Therefore, this resource meets the Importance Criterion 1.

4.1.1.2.2 Lithic Quarries

Importance (No): The type of material procured from a lithic quarry and the extent of its distribution, whether local or regional, determines the eligibility and importance of the site. Obsidian is considered an especially high-quality tool stone material and can provide scientific value in the form of hydration dating and XRF sourcing analysis, which can help to determine possible prehistoric trade routes. However, the lithic quarries within the nominated ACEC are not documented as containing large quantities of obsidian; therefore, this resource does not meet the Importance Criterion 1.

4.1.1.2.3 Rock Shelters

Importance (Yes): Throughout the Great Basin, archaeological deposits are typically surficial in nature and lack highly stratified deposits. Few environmental conditions within the region allow for the deposition, rather than erosion, of an archaeological deposit to occur. Rock shelter sites provide a unique depositional environment, wherein aeolian silts and sands can be deposited, and thereby protect the integrity of the subsurface archaeological deposits. Additionally, the rock shelter covering the site further protects it from the subaerial erosion that typically occurs and negatively affects open archaeological sites. Rock shelter sites are often long-term habitation sites, are NHRP-eligible, are considered rare, and form an important part of the archaeological record. Additionally, rock shelters are often culturally and spiritually significant places for the Western Shoshone, and disturbance within rock shelters is incompatible with their religious views. Therefore, these resources meet the Importance Criterion 1.

4.1.1.2.4 Open Lithic Scatters

Importance (No): Archaeological sites that consist primarily of surficial archaeological deposits relating to lithic reduction without any diagnostic artifacts are generally NHRP-ineligible. This is the case for the majority of open lithic scatters within the nominated ACEC. Therefore, these resources do not meet the Importance Criterion 1.

4.1.1.2.5 Open Habitation Sites

Importance (Yes): Open habitation sites, especially those found along pluvial lakes from the terminal Pleistocene/Early Holocene, are poorly documented in the Great Basin. Sites such as the recorded sites along pluvial Lake Tonopah within the nominated ACEC are likely to provide insight to terminal Pleistocene and early Holocene transitional prehistoric lifeways. Additionally, these sites could further develop the scientific understanding of active valley-bottom depositional environments during the terminal Pleistocene and Early Holocene transition and how prehistoric cultures adapted to changing climates. Additionally, these sites may be considered culturally and spiritually significant to tribes and could be eligible for inclusion in the NRHP under Criteria A or B for their important to Native American History. Therefore, habitation sites buried in Holocene-age sand dunes and loess are considered to have more than local significance and meet the Importance Criterion 1.

4.1.1.3 Unrecorded Cultural Sites

Importance (No): All cultural resources that are recorded within the nominated ACEC boundary have the potential to meet the Importance Criteria outlined in BLM Manual 1613, *Areas of Critical Environmental Concern* (BLM 1988). However, the cultural resource must first be documented and evaluated by both the BLM and the State Historic Preservation Office (SHPO) to determine whether it is NRHP-eligible. In this case, it is not possible to assess the importance of unknown sites until the resources are discovered and subsequently evaluated for NRHP eligibility. Therefore, these resources do not meet the Importance Criterion 1.

4.1.2 Visual/Scenic Resources

Importance (No): The majority of the nominated ACEC, approximately 687,481 acres, is identified as VRI Classes III and IV and 750,035 acres, or approximately 88 percent of the nominated ACEC are managed as VRM Class IV. In addition, no areas in the nominated ACEC have high scenic value ratings; the entire nominated ACEC area is assigned scenic value ratings of B and C. The visual/scenic qualities of this area are similar across the landscape and do not give the area special worth, consequence, meaning, or distinctiveness. Two areas within the nominated ACEC are identified as VRI Class I and comprise approximately 35,194 acres (4 percent of the nominated ACEC). These two areas have been recognized for their scenic resources and are managed to conserve those resources. The nominated ACEC outside these areas does not meet Importance Criterion 1.

4.1.3 Fish and Wildlife Resources

Importance (No): Fish and wildlife resources within the nominated ACEC are not unique when compared to the surrounding landscape within Nevada. Therefore, fish and wildlife resources do not meet Importance Criterion 1.

4.1.4 Plant Resources

4.1.4.1 Vegetation Resources

Importance (Yes): Although the vegetation types within the nominated ACEC are not globally rare, their biogeographic location and connectivity across broad ecological and elevation gradients are unique. The nomination stated the following about the nominated ACEC area:

> "includes an assemblage of lands that are at a unique crossroads - biogeographically, ecological, and climatically. In biogeographic terms, the Esmeralda/Fish Lake ACEC lies at a compound intersection between Californian and Great Basin mountain terrains, and between Mojave and northern Great Basin desert terrains. The critical ecological importance of the Esmeralda/Fish Lake ACEC arises from the extremely wide diversity of ecosystems associated with 5,000 feet of relief, insolation aspects, soil types, rock types, drainage systems, intricate terrain, and extremes in precipitation and temperatures (FNW 2023:19)."

Therefore, vegetation resources meet Importance Criterion 1 for the ACEC nomination.

4.1.4.2 Plant Resources

Importance (Yes): The plant resources in the nominated ACEC include Tiehm's buckwheat, a rare plant found in a very small area of the Silver Peak Range (outside the existing Silver Peak Range Wilderness Study Area) and nowhere else. The nominated ACEC also includes one of only two population areas for Tecopa bird's beak in Fish Lake Valley. Therefore, plant resources meet Importance Criterion 1.

4.1.5 Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs

Importance (No): Soils, watersheds, riparian areas, wetlands, seeps, and springs within the nominated ACEC are not unique when compared to the surrounding landscape. Therefore, soils, watersheds, riparian areas, wetlands, seeps, and springs do not meet Importance Criterion 1.

4.2 Fragile and Sensitive Qualities (Importance Criterion 2)

4.2.1 Cultural Resources

4.2.1.1 Historic Sites

4.2.1.1.1 Mineral Ridge Historic Mining District

Importance (No): The MRHMD consists of a large variety of historic sites related to mining, transportation, and habitation in the area. Most sites within the area have had structures and machinery deconstructed for scrap in the decades after use. What remains of most sites are surficial artifacts scatter and foundational elements. These types of sites are not considered especially fragile or sensitive. Therefore, this district does not meet Importance Criterion 2.

4.2.1.1.2 Pacific Borax Works

Importance (No): All of the original extant structures and refining machinery have been relocated. The site currently consists of a moderate-density artifact surface scatter and a variety of features that are primarily earth modifications and dump piles related to processing. None of the remaining portions of the site are especially fragile or sensitive. Therefore, this site does not meet Importance Criterion 2.

4.2.1.2 Prehistoric Sites

See Section 3.1.1, *Cultural Resources*, for a detailed description of prehistoric archaeological site types.

4.2.1.2.1 Cave Spring

Importance (Yes): Great Basin painted pictographs exhibit unique cultural traditions and imagery that is diagnostic of the associated culture or time period and provides insights into the lifeways and religious practices of prehistoric societies. In general, archaeological sites containing pictographs and/or petroglyphs are irreplaceable and particularly vulnerable to both human and natural impacts and are considered both extremely fragile and sensitive. Additionally, Cave Spring is a known cultural resource for the Timbisha Shoshone, who view the site as both a habitation site and a ceremonial location that is important to their history and identity related to past events of cultural significance at the site (Giambastiani 2016, 2019). Therefore, this resource meets the Importance Criterion 2.

4.2.1.2.2 Lithic Quarries

Importance (No): In general, lithic quarries are located in exposed geological formations that contain high-quality tool-stone materials. Despite having a cultural affiliation, these strata have likely been exposed to subaerial erosion for a significant amount of time and are not considered especially fragile or sensitive. Therefore, this resource does not meet Importance Criterion 2.

4.2.1.2.3 Rock Shelters

Importance (Yes): Throughout the Great Basin, archaeological deposits are typically surficial in nature and lack highly stratified deposits. Few environmental conditions within the region allow for the deposition, rather than erosion, of an archaeological deposit to occur. Rock shelter sites provide a unique depositional environment, wherein aeolian silts and sands can be deposited, and thereby protect the integrity of the subsurface archaeological deposits. Additionally, the rock shelter covering the site further protects it from the subaerial erosion that typically occurs and negatively affects open archaeological sites. Rock shelter sites are often long-term habitation sites, are NRHP-eligible, and are considered especially fragile and sensitive because of the detrimental effects of human and natural impacts on the integrity of the archaeological deposit. This unique preservation environment is the reason rock shelters are frequently targeted by unauthorized and illegal excavations, which result in destruction of the archaeological site and its integrity. Therefore, these resources meet Importance Criterion 2.

4.2.1.2.4 Lithic Scatters

Importance (No): Archaeological sites that consist primarily of surficial archaeological deposits relating to lithic reduction without any diagnostic artifacts are generally NRHP-ineligible. This is the case for the majority of open lithic scatters within the nominated ACEC. Because of the general lack of NRHP-eligibility and the lack of intact subsurface deposits, these sites are not considered especially fragile or sensitive. Therefore, these resources do not meet Importance Criterion 2.

4.2.1.2.5 Open Habitation Sites

Importance (Yes): Open habitation sites are likely to contain a variety of biological remains that contain fragile or sensitive qualities, such as structural remains, carbonized food remains, cordage, and shafts. These archaeological remains, if located on the surface, would decompose at a rapid rate and leave little-to-no evidence of their existence. However, depending on the underlying soil geology, these remains in a subsurface context may be preserved and would be invaluable in answering research questions in Great Basin archaeology. There are several depositional environments within the nominated ACEC that are conducive to the preservation of archaeological resources, such as vast sand dunes along the paleo shoreline of pluvial lakes and deep veneers of loess throughout valley bottoms. Therefore, habitation sites have fragile and sensitive qualities and meet Importance Criterion 2.

4.2.1.3 Unrecorded Cultural Sites

Importance (No): All cultural resources recorded within the nominated ACEC boundary have the potential to meet the importance criterion as outlined in the BLM Manual 1613, *Areas of Critical Environmental Concern* (BLM 1988). However, the cultural resource must first be documented and evaluated by both the BLM and SHPO to determine whether it is NHRP-eligible. In this case, it is not possible to assess the importance of unknown sites until the resources are discovered and subsequently evaluated for NRHP eligibility. Therefore, these resources do not meet Importance Criterion 2.

4.2.2 Visual/Scenic Resources

Importance (No): Based on the VRI, the majority of the nominated ACEC boundary has been identified as VRI Class III and Class IV and managed as VRM Class IV. There are portions of the nominated ACEC under VRI Classes II and III that are managed at VRM Class IV, reflecting a higher level of visual quality for those areas than what they are being managed for. However, no areas in the nominated ACEC have high scenic value ratings; the entire nominated ACEC area is assigned scenic value ratings of B and C. For areas that are designated VRI Class I, the BLM is managing those areas as VRM Class I and special designations have already been established for these areas (i.e., The Sump ACEC and Pinyon Joshua Instant Study Area). The visual characteristics in the remainder of the nominated ACEC would not be deemed fragile, sensitive, or unique and would not meet Importance Criterion 2.

4.2.3 Fish and Wildlife Resources

Importance (No): The nomination states that the area within the nominated ACEC includes the Mojave Desert/Great Basin transition zone and supports a diversity of wildlife resources, including bighorn sheep, greater sage-grouse, and mountain lion, and provides habitat-supporting vertebrate species richness in Fish Lake Valley and the Esmeralda area (FNW 2023:1, 13–15). Thirteen species listed under the ESA or Proposed or Candidate species were reviewed for their potential to occur within the nominated ACEC through a desktop review pending requested species occurrence data from BLM. Bi-state sage-grouse and monarch butterfly have potential to occur, as discussed in Section 3.2, *Fish and Wildlife Resources (Relevance Criterion 2)*. No other listed species were determined to have potential to occur in the nominated ACEC boundary. Protections by current BLM management and policies within the nominated ACEC are sufficient to protect these resources. Therefore, fish and wildlife resources do not meet Importance Criterion 2.

4.2.4 Plant Resources

4.2.4.1 Vegetation Resources

Importance (Yes): Desert vegetation is fragile and takes a long time to recover from disturbance. Current management direction allows extractive uses, livestock grazing, OHV use, and other uses that can disturb soil, remove vegetation, and alter the fragile hydrological processes that sustain vegetation. ACEC designation would provide additional protection to maintain intact desert vegetation types and ecosystems. Therefore, vegetation resources meet Importance Criterion 2.

4.2.4.2 Plant Resources

Importance (Yes): Tiehm's buckwheat is an Endangered plant that is confined to a very small area (approximately 10 acres) in the Rhyolite Ridge area, where it grows on an uncommon and challenging soil type and appears to be limited in its ability to disperse seeds to any great distance. Because of the very small range, small population size, and challenging growing conditions, this plant is highly vulnerable to disturbance. Primary threats to this plant include mining, road development, OHV use, and livestock grazing (USFWS 2022b). Under current BLM management, the Rhyolite Ridge area is open to mining under the Mining Law and subject to compliance with the BLM's regulations at 43 CFR subparts 3715 and 3809 (BLM 1997). In addition, the plant is within the Silver Peak grazing allotment, where there are no specific restrictions or conditions for livestock use that would protect the plant from trampling and grazing. Therefore, plant resources meet Importance Criterion 2.

4.2.5 Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs

Importance (No): The nomination states that the nominated Esmeralda/Fish Lake ACEC is "highly vulnerable" to adverse climate change. However, ACECs are designed to protect areas from direct management actions, rather than changes in natural processes. Although elements of soils, watersheds, riparian areas, wetlands, seeps, and springs within the nominated ACEC are inherently fragile or sensitive, current BLM management and policies are sufficient to protect these resources such that they are not vulnerable to adverse change. Therefore, soils, watersheds, riparian areas, wetlands, seeps, and springs do not meet Importance Criterion 2.

4.2.6 Paleontological Resources

Importance (No): As noted in the nomination, the paleontological and paleoecological resources of The Sump ACEC have a nationwide scientific importance. However, the paleontological and paleoecological resources of The Sump ACEC are already protected by the area's ACEC designation for the specific purposes of protecting areas with significant paleontological resources. Although other portions of the nominated ACEC are underlain by geologic units with high (PFYC 4) and very high (PFYC 5) paleontological potential, they are not known to produce paleontological resources of scientific importance. Furthermore, current BLM management and policies for protecting paleontological resources are sufficient to protect paleontological resources. Therefore, paleontological resources do not meet Importance Criterion 2.

4.3 National Priority Concerns (Importance Criterion 3)

Importance (No): The nomination states that the area will "provide an opportunity for the BLM to fulfill this mandate [FLMPA § 102(a)(8)] by establishing the first ACEC in a county wherein 94% of the land is managed by the BLM." However, the requirement to manage public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" in accordance with FLPMA applies to all public land. This area has not been recognized as warranting protection in order to satisfy national priority concerns. Therefore, the nominated area does not meet Importance Criterion 3.

4.4 Public and Management Concerns (Importance Criterion 4)

Importance (No): The nomination did not identify public or management concerns about safety or public welfare in the area. The BLM also did not identify any areas of hazards of significance in the area (see Section 3.4). Therefore, public and management concerns do not meet Importance Criterion 4.

4.5 Threats to Human Life or Property (Importance Criterion 5)

Importance (No): No natural hazards of significance were identified as meeting the relevance criteria (see Section 3.4); therefore the site does not meet Importance Criterion 5.

5.0 SPECIAL MANAGEMENT ATTENTION

As described in BLM Manual 1613 (1988)

> "To be designated as an ACEC, an area must require special management attention to protect the important and relevant values (43 CFR 1601.0-5(a)). 'Special management attention' refers to management prescriptions developed during preparation of an RMP expressly to protect the important and relevant values of an area from the potential effects of actions permitted by the RMP. These are management actions that would not be necessary if the relevant and important values were not present."

5.1 Cultural Resources

Table 5-1, at the end of this section, contains a summary of the R&I values and Special Management Needs for key cultural resources from all previous sections combined.

5.1.1 Historic Sites

See Section 3.1.1, *Cultural Resources*, for a detailed description of historic archaeological sites.

5.1.1.1 Mineral Ridge Historic Mining District

Management Needs (None Identified): The resource does not meet both R&I criteria. Therefore, no special management needs are required.

5.1.1.2 Pacific Borax Works

Management Needs (None Identified): The resource does not meet both R&I criteria. Therefore, no special management needs are required.

5.1.2 Prehistoric Sites

See Section 3.1.1, *Cultural Resources*, for a detailed description of prehistoric archaeological site types.

5.1.2.1 Cave Spring

Management Needs (None Identified): The site has been adversely affected by looting and vandalism over the last few decades, which has been largely limited to the midden area in front of the rock shelter. Located near Coyote Road, the site is easily accessible to the public due to its high visibility from the county road. Although limiting access to the site is not feasible, recommendations were made to protect the midden apron from further looting. This work was performed by G2 in 2016 and included anchoring a section of heavy-gauge chain-link fencing across the midden, capping the area in 1 to 2 feet of local rocky fill material, and then anchoring the fence in place with metal posts. The BLM determined that these anti-looting measures were necessary to preserve the integrity of the subsurface archaeological deposit. The site does meet both the R&I criteria; however, the actions to protect and preserve this site have occurred while executing Section 106 of the National Historic Preservation Act of 1966 (NHPA). Therefore, the existing statutory responsibilities of the BLM are sufficient for managing this site, and additional special management attention is not required.

With regard to the potential for future discovery of other such rock writing sites, the BLM has existing statutory responsibilities to identify and protect both known and unknown Historic Properties on lands administered by the agency. This includes any unrecorded archaeological sites within the nominated ACEC. Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on

Historic Properties; thus, this identification and documentation of historic properties in consultation with the SHPO/Tribal Historic Preservation Officer (THPO) for NRHP evaluation, as stipulated in 36 CFR Section 800.4, and the resolution of adverse effects, which include the development and evaluation of alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on Historic Properties as stipulated in 36 CFR Section 800.6. Under the Section 106 process, the Area of Potential Effect (APE) for any nominated undertaking has a Class III Intensive Pedestrian Survey performed by a Secretary of the Interior-qualified archaeologists in order to identify potentially significant cultural resources that could be affected.

5.1.2.2 Lithic Quarry Sites

Management Needs (None Identified): The resource does not meet both R&I criteria. Therefore, no special management needs are required.

5.1.2.3 Rock Shelters

Management Needs (None Identified): The resource does meet both R&I criteria. However, special management attention is unnecessary due to existing NHPA regulations, as described above, which are already in place to protect all archaeological resources within the nominated ACEC.

5.1.2.4 Open Lithic Scatters

Management Needs (None Identified): The resource does not meet both R&I criteria. Therefore, no special management needs are required.

5.1.2.5 Open Habitations

Management Needs (None Identified): The resource does meet both R&I criteria. However, special management attention is unnecessary due to existing NHPA regulations, as described above, which are already in place to protect all archaeological resources within the nominated ACEC.

5.1.3 Unrecorded Cultural Sites

Management Needs (None Identified): The BLM has existing statutory responsibilities under Section 106 of the NHPA, including the identification and documentation of historic properties in consultation with the SHPO/THPO for NRHP evaluation, as stipulated in 36 CFR Section 800.4, and the resolution of adverse effects, which include the development and evaluation of alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties, as stipulated in 36 CFR Section 800.6. All presently undocumented archaeological sites within the nominated ACEC boundary fall under these responsibilities. However, it is not practical to prescribe special management practices for unknown and hypothetical resources.

Table 5-1. Summary of Key Cultural Resource R&I Values and Special Management Needs within the Nominated ACEC

Resource	Relevance	Importance	Special Management Attention Required?	Comments
Historic Sites				
Mineral Ridge Historic Mining District	No	Yes	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Pacific Borax Works	No	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Prehistoric Site Types				
Cave Spring	Yes	Yes	None identified	Special management attention has already been given to this site in order to protect the integrity of the subsurface archaeological deposit. Therefore, Existing NHPA Section 106 statutory responsibilities are sufficient. Special management attention not required.
Lithic Quarries	No	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Rock Shelters	Yes	Yes	None identified	Existing NHPA Section 106 statutory responsibilities are sufficient. Special management attention not required.
Open Lithic Scatters	No	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Open Habitations	Yes	Yes	None identified	Existing NHPA Section 106 statutory responsibilities are sufficient. Special management attention not required.
Undocumented Cultural Sites	No	No	None identified	Existing NHPA Section 106 statutory responsibilities are sufficient. Special management attention not required.

5.2 Visual/Scenic Resources

Special management attention is not recommended for visual/scenic resources because the R&I criteria have not been met for these resources in the majority of the nominated ACEC boundary. Two areas within the nominated ACEC boundary are already designated as an ACEC and an Instant Study Area and these areas have management that is sufficient to conserve the visual/scenic resources.

5.3 Fish and Wildlife Resources

Special management attention is not recommended for fish and wildlife resources because management is occurring through existing management plans, including the Tonopah and Carson City RMPs, in addition to other plans that are administered in coordination with BLM, including the *Bighorn Sheep Management Plan* (NDOW 2001), the *Land Use Plan Amendment for the Nevada and California Greater Sage-Grouse Bi-State Distinct Population Segment in the Carson City District and Tonopah Field Office* (BLM 2016a), and the *Elk Management Plan, Big Game Season Prescriptions and Management Objectives for Quota Recommendations* (NDOW 2022).

5.4 Plant Resources

The BLM has implemented special management attention to protect Tiehm's buckwheat. This Endangered plant occupies a very small area and is vulnerable to disturbance and habitat alteration from mining activity, OHV vehicles, and grazing. Although the area occupied by Tiehm's buckwheat has not been withdrawn from mineral entry, when a plan of operations application is submitted to the BLM, the project is subjected to the NEPA process and can be revised to avoid and minimize impacts to protect Endangered species. To restrict access of OHVs, the BLM constructed two pipe-rail fences to protect specific subpopulations of Tiehm's buckwheat, and the BLM continues to monitor the effectiveness of these fences. In the Rhyolite Ridge area, vehicles are limited to existing roads and trails. Any proposed new roads in the area would be subject to NEPA and ESA review.

Populations of Tiehm's buckwheat occur in the Silver Peak Allotment. Trampling has been observed in one of the subpopulations, and the BLM coordinated with the permittee to move livestock away from that area (USFWS 2021). The permit for the Silver Peak Allotment was authorized in September 2020 with a 4-year term, and expires on September 24, 2024. On expiration, the BLM will consider reauthorization or changing the number of active animal unit months. The BLM is obligated to evaluate how grazing permits would affect ESA-listed species through the Section 7 process and consult with the USFWS on how grazing activities should be conducted, changed, or curtailed to ensure that they do not jeopardize the listed species. Any special management for this species would be identified through that process. Additional special management attention is not required; existing regulations are sufficient.

5.5 Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs

Special management attention is not required for soils, watersheds, riparian areas, wetlands, seeps, or springs because the R&I criteria for these resources have not been met within the nominated ACEC.

5.6 Paleontological Resources

Special management attention is not recommended for paleontological resources because existing management for R&I values of The Sump ACEC and the BLM's policy for management of areas with moderate, high, and very high paleontological potential (see Table 3-3) provide adequate protection for paleontological resources within the nominated ACEC.

6.0 EXISTING ACEC MANAGEMENT

The BLM lands within the nominated ACEC are managed by the Tonopah RMP (BLM 1997) and the Carson City Consolidated RMP (BLM 2001). These RMPs provide the overarching framework for the management of the nominated ACEC and provide for multiple land uses, including conservation, recreation, and resource development. Within the nominated ACEC, there are three BLM special designations: (1) The Sump ACEC;(2) Silver Peak WSA; and (3) Pinyon Joshua Instant Study Area.

The Sump ACEC (41,863 acres) is currently managed in accordance with the guidelines outlined in the Tonopah ROD (BLM 1997). The management strategy was designed to protect the sensitive resource values within the ACEC, including Threatened and Endangered species and cultural resources. Within the ACEC, vehicle access is restricted to existing roads and trails within designated areas, and competitive special-recreation events are not permitted. In addition, mineral material disposal and nonenergy mineral leasing are prohibited.

The Silver Peak Range WSA (33,900 acres) is currently managed in accordance with the Tonopah ROD (BLM 1997) and BLM Manual 6330, Management of BLM Wilderness Study Areas (BLM 2012). Management decisions include, but are not limited to, closing the area to fluid mineral leasing, restricting surface-disturbing activities that require reclamation, requiring review and mitigation of geophysical exploration, and managing the area as Interim VRM Class II (to avoid impairment of existing wilderness values) until Congress makes final wilderness decisions for Nevada BLM WSAs. If the WSA were not designated as wilderness by Congress, then the area would return to multiple-use management in accordance with the RMP.

The Pinyon Joshua Instant Study Area (560 acres) was designated because it represents the northern extreme of the Joshua tree. The area is currently managed in accordance with the Tonopah ROD (BLM 1997) and BLM Manual 6330, Management of BLM Wilderness Study Areas (BLM 2012). If Congress were to not designate the area as wilderness, then it would return to multiple-use management in accordance with the RMP.

The remaining portions of the nominated ACEC are managed for multiple uses as identified in the Tonopah ROD (BLM 1997) and the Carson City Consolidated RMP (BLM 2001). Management decisions are implemented in accordance with federal regulations and policies, considering factors such as recreation, grazing, and other resource development activities.

Cultural resource management adheres to the NHPA and the Archaeological Resources Protection Act of 1979. Under these laws and associated regulations, like 36 CFR 60 and 43 CFR 8365.1-5(a)(1), the BLM is mandated to identify, evaluate, and protect cultural resources on public lands. As required under NHPA Section 106, the BLM consults with the Nevada SHPO for eligibility determinations for listing on the NRHP. The Tonopah ROD (BLM 1997) provides specific determinations for ongoing practices, classification, and management of cultural resources, including the development of activity plans and a comprehensive rock-art management plan.

The BLM ensures that paleontological resources are managed to protect specimens and maintain or enhance their scientific and educational values. Specific areas identified for the conservation of paleontological resources include fossiliferous sedimentary rocks and Quaternary alluvium, Lone Valley, Tonopah Flat, and Gabbs Valley. The Trap Springs–Gravel Bar Complex is managed to maximize data recovery and salvage of cultural and paleontological resources, while also allowing for oil and gas production.

The Tonopah ROD’s (BLM 1997) management of Threatened and Endangered species aligns with the ESA and BLM Sensitive Species policies. The ROD identifies management for the protection of specific species, including, but not limited to, placing restrictions on livestock grazing, incorporating timing limitations, limiting vehicles to existing roads and trails, and closing areas to competitive recreation events. Under the Tonopah ROD, habitat for all federally listed or BLM Sensitive species would be managed to maintain or increase current populations of these species.

Watershed management in the Tonopah ROD (BLM 1997) emphasizes the preparation and implementation of activity plans in high erosion-potential areas. These plans utilize rehabilitation techniques in watersheds, such as Oasis Valley and Wagon Johnnie. As needed, mitigation measures would be implemented that maintain or enhance soil productivity and prevent erosion and floodplain sediment damage. During project-level review, the BLM would identify best management practices. The ROD's management strategies address cultural resources, special status species, watershed conditions, and soil and water resources, with detailed RMP determinations guiding implementation.

The Tonopah ROD (BLM 1997) designated VRM classes based on an inventory conducted per the BLM's visual management procedures. These classes, outlined in the Tonopah ROD (BLM 1997), guide management objectives for the planning area. Stipulations, developed during project authorizations, range from situating activity sites behind topographic features to color-coding structures to blend with the surroundings. Designation of VRM classes (Class I to Class IV) ensures that contrasts and changes resulting from management activities align with the inherent characteristics of each area.

7.0 ACEC MANAGEMENT CHALLENGES AND OPPORTUNITIES

This section identifies management challenges and opportunities based on the ACEC recommendations and other BLM-provided information and proposes potential strategies to address them, noting any important considerations (e.g., planning-level decision) (Table 7-1).

Table 7-1. Potential Strategies to Address ACEC Management Challenges and Opportunities

Challenge or Opportunity	Potential Strategy to Address
Challenge: Size of Nominated ACEC	The nominated ACEC is approximately 850,000 acres and would be difficult to manage at this size. Smaller areas that meet relevance and importance criteria and require special management attention could be evaluated as smaller ACECs through the land use planning process.
Opportunity: Reduced Size of ACEC	If there are areas that meet the relevance and importance criteria and need special management attention, the BLM could consider designating smaller areas as ACECs in an alternative during the RMP planning process.
Challenge: Valid Existing Rights within the Nominated ACEC	There are numerous valid existing rights for authorized rights of ways, permits, leases, and other actions within the 850,000-acre nominated ACEC. The BLM must consider these rights when recommending ACECs for designation.

8.0 SUMMARY OF FINDINGS

This section summarizes the findings of the ACEC report, and addresses whether the nominated ACEC warrants actual ACEC designation. Table 8-1 summarizes the resources evaluated in this document, identifies if they meet R&I values and if special management attention is needed.

Table 8-1. Summary of Resources R&I Values and Special Management Needs within the Nominated ACEC

Resource	Relevance	Importance	Special Management Attention	Comments
Cultural Resources	Yes (Criterion 1)	Yes (Criterion 1)	None identified	For some types of cultural resources, R&I criteria have been met, but either special management attention has already been given to the site, or existing NHPA Section 106 statutory responsibilities would be sufficient to protect these sites.
Visual/Scenic Resources	No	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Fish and Wildlife Resources	Yes (Criterion 2)	No	None identified	Fish and wildlife resources do not meet both the relevance and importance criteria, and special management attention is not required.
Vegetation and Plant Resources	Yes (Criterion 3)	Yes (Criteria 1, 2)	None identified	The resource meets both relevance and importance criteria, but no special management attention is recommended at this time. The Section 7 process would be sufficient to protect these resources.
Soils, Watersheds, Riparian Areas, Wetlands, Seeps, and Springs	Yes (Criterion 3)	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.
Paleontological Resources	Yes (Criterion 3)	No	None identified	The resource does not meet both relevance and importance criteria. Therefore, no special management needs are required.

Based on the evaluation of the resources within the nominated ACEC, R&I criteria have been met for some cultural resources and plant resources. These resources are located in various areas throughout the nominated ACEC and, in some cases, are limited in their occurrence. However, no special management attention has been identified for these resources. Existing management and statutory responsibilities would be sufficient to protect these resources. Therefore, designating the 850,000-acre nominated Fish Lake/Esmeralda ACEC is not recommended.

9.0 LIST OF PREPARERS AND REVIEWERS

Table 9-1 identifies the preparers and reviewers of this report.

Table 9-1. List of Preparers and Reviewers

Name / Organization	Role / Expertise
Brian Buttazoni/BLM	GLWP Project Manager
James Priest/BLM	GLWP Wildlife Biologist
Scott Distel/BLM	BMDO Supervisory Project Manager
Tim Van der Voort/BLM	GLWP Archaeologist, Tribal Coordinator, Paleontology Coordinator
ICF	Lead Author
Logan Simpson	Reviewer

10.0 LIST OF REFERENCES

Blackburn, Paul W., John B. Fisher, William E. Dollarhide, Douglas J. Merkler, Joseph V. Chiaretti, and James G. Bockheim. 2021. *The Soils of Nevada*. World Soils Book Series. Switzerland: Springer.

Brower, L. P., L. S. Fink, and P. Walford. 2006. Fueling the fall migration of the monarch butterfly. *Integrative and Comparative Biology* 46(6):1,123–1,142.

Bureau of Land Management (BLM). 1988. BLM Manual 1613, *Areas of Critical Environmental Concern*. Available: https://www.ntc.blm.gov/krc/system/files?file=legacy/uploads/5657/5_1613_ACEC_Manual%201988.pdf. Accessed: November 15, 2023.

Bureau of Land Management (BLM). 1997. *Approved Tonopah Resource Management Plan and Record of Decision*. Available: https://eplanning.blm.gov/public_projects/lup/77957/104362/127931/1997_Tonopah_RMP_and_Record_of_Decision_-_APPROVED.pdf. Accessed: November 15, 2023.

Bureau of Land Management (BLM). 2001. *Carson City Field Office Consolidated Resource Management Plan and Associated Amendments*. Available: https://eplanning.blm.gov/eplanning-ui/project/77963/570. Accessed: November 15, 2023.

Bureau of Land Management (BLM). 2007. *Nevada Bureau of Land Management Battle Mountain District Visual Resource Management Class GIS Data*. Available: https://eplanning.blm.gov/public_projects/77513/200171425/20100045/251000045/BattleMtn%20Dist%20VRI%20report%20Sections1-5_Part2.pdf. Accessed: November 15, 2023.

Bureau of Land Management (BLM). 2012. BLM Manual 6330, *Management of Wilderness Study Areas*. Available: https://www.blm.gov/sites/default/files/uploads/mediacenter_blmpolicymanual6330.pdf. Accessed: November 15, 2023.

Bureau of Land Management (BLM). 2015. *Record of Decision and Approved Resource Management Plan Amendments for the Great Basin Region*.

Bureau of Land Management (BLM). 2016a. *Record of Decision and the Land Use Plan Amendment for the Nevada and California Greater Sage-Grouse Bi-State District Population Segment in the Carson City District and Tonopah Field Offices*.

Bureau of Land Management (BLM). 2016b. *Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands*. Instruction Memorandum 2016-124. Available: https://www.blm.gov/policy/im-2016-124. Accessed: December 8, 2023.

Bureau of Land Management (BLM). 2022. Nevada Bureau of Land Management Visual Resource Inventory GIS Data. Available: https://storymaps.arcgis.com/stories/8db3595ed1b0409e9a6e6194133ce4cf. Accessed: December 8, 2023.

Bureau of Land Management (BLM). 2023a. *Nevada Bureau of Land Management Special Status Species List*. Updated September 2023. Available: https://www.blm.gov/sites/default/files/docs/2023-11/NV-IM-2024-003%20att%201%20BLM%20Nevada%20Special%20Status%20Species%20List_0.pdf. Accessed: December 8, 2023.

Bureau of Land Management (BLM). 2023b. U.S. Department of the Interior, Bureau of Land Management GIS Data and Analysis. Available: https://www.blm.gov/services/geospatial/GISData. Accessed: December 8, 2023.

Castleton, Kenneth B., and David B. Madsen. 1981. The Distribution of rock art elements and styles in Utah. *Journal of California and Great Basin Anthropology* 3(2):163–175.

Center for Biological Diversity. 2023. *Petition to the U.S. Fish and Wildlife Service to List the Tecopa Bird's Beak (*Chloropyron tecopense*) under the Endangered Species Act as a Threatened or Endangered Species and to Concurrently Designate Critical Habitat*. September 26. Shoshone, CA.

Central Nevada Regional Water Authority (CNRWA). 2023. *About CNRWA*. Available: https://cnrwa.com/about-cnrwa/. Accessed: November 28, 2023.

Eerkens, Jelmer W. 2003. Towards a chronology of brownware pottery in the western Great Basin: a case study from Owens Valley. *North American Archaeologist* 24(1):1–27.

Felling, Danielle C. 2018. *IMACS Site form for CrNV-64-18615*. On file at the BLM Tonopah Field Office, Battle Mountain District, Tonopah, Nevada.

Friends of Nevada Wilderness (FNW). 2023. *Esmeralda/Fish Lake Area of Critical Environmental Concern Proposal*.

Giambastiani, Mark A. 2016. *IMACS Site form for site 26ES1566*. On file at the BLM Tonopah Field Office, Battle Mountain District, Tonopah, Nevada.

Giambastiani, Mark A. 2019. *Exploratory Trenching and Test Excavations at Cave Spring (CrNV-64-7851/26ES1566), Esmeralda County, Nevada*. Prepared by G2 Archaeology for the Bureau of Land Management, Battle Mountain District, Tonopah Field Office, Nevada. BLM Report No. CR6-3182-12 (P).

Heizer, R. F., and M. A. Baumhoff. 1962. Prehistoric rock art of Nevada and eastern California. *The Journal of California Anthropology* 3(1). Merced, CA: University of California Press.

Jamaldin, Sophia A., Traevis L. Field, and Danielle C. Felling. 2020. *A Class III Cultural Resource Inventory of 5,034 Acres for the Rhyolite Ridge Mine Project, Esmeralda County, Nevada.* CR 6-3256, on file at the Bureau of Land Management, Battle Mountain District, Tonopah Field Office, Nevada.

Kautz Environmental Consultants, Inc. 2012. *IMACS Site form for CrNV-64-18615*. On file at the BLM Tonopah Field Office, Mattle Mountain District, Tonopah, Nevada.

Livingston, Stephanie. 1995. *Report of Test Excavations at the Cave Spring Site, Tonopah Resource Area, Nevada*. Report on file at Bureau of Land Management, Battle Mountain District, Tonopah Field Office.

McGwire, K. 2019. Optimized stratification for mapping riparian vegetation in arid and semiarid environments. *Remote Sensing* 11(14):1,638. DOI:10.3390/rs11141638. Available: https://www.dri.edu/wp-content/uploads/McGwire_2019.pdf. Accessed: November 28, 2023.

McLane, Alvin R. 1982. *IMACS Site form for site CrNV-05-4238/26E632*. On file at the BLM Tonopah Field Office, Battle Mountain District, Tonopah, Nevada.

Moore S. and O. Patsch. 2011. *IMACS Site form for 26ES1566*. On file at the BLM Field Office, Battle Mountain District, Tonopah, Nevada.

Natural Resources Conservation Service (NRCS). 2023. *Gridded Soil Survey Geographic (gSSURGO) Database*. Available: https://www.nrcs.usda.gov/resources/data-and-reports/gridded-soil-survey-geographic-gssurgo-database. Accessed: November 28, 2023.

Nevada Department of Wildlife (NDOW). 2001. *Bighorn Sheep Management Plan*. October

Nevada Department of Wildlife (NDOW). 2012. Nevada Wildlife Action Plan. Wildlife Action Plan Team. Reno, NV: Nevada Department of Wildlife.

Nevada Department of Wildlife (NDOW). 2022. *Big Game Season Prescriptions and Management Objectives for Quota Recommendations*. Draft. January 6.

Nevada Natural Heritage Program (NNHP). 2008. *Nevada Vegetation Synthesis Map.* Available: https://heritage.nv.gov/gis. Accessed: November 2023.

Powell, C., J. Lundemo, and M. Allen. 2023. *IMACS Site form for CrNV-05-4238*. On file at the BLM Tonopah Field Office, Battle Mountain District, Tonopah, Nevada.

Reveal, J. L. 1985. New Nevada entities and combinations in *Eriogonum* (Polygonaceae). *Great Basin Naturalist* 45:276–280.

Rhode, David. 1994. Direct Dating of Brown Ware Ceramics Using Thermoluminescence and Its Relation to the Numic Spread. In *Wetland Adaptations in the Great Basin*, edited by Janet, B. Janetski and David B. Madsen, pp. 107–120. Brigham Young University Museum of Peoples and Cultures, Occasional Papers No. 1. Provo, UT: Brigham Young University.

Saito, L., S. Byer, K. Badik, K. McGwire, L. Provencher, and B. Minor. 2020. Mapping indicators of groundwater dependent ecosystems in Nevada: Important resources for a water-limited state. *Journal of the Nevada Water Resources Association*, Winter 2020:48–72. DOI: 10.22542/jnwra/2020/1/3. Available: http://webfiles.dri.edu.s3.amazonaws.com/McGwire/SaitoNWRA2020.pdf. Accessed: November 28, 2023.

Sherlock, Maureen G., D. P. Cox, D. F. Huber, and D. A. Singer. 1996. *Known Mineral Deposits and Occurrences in Nevada. An Analysis of Nevada's Metal-Bearing Mineral Resources*. Nevada Bureau of Mines and Geology Open-File Report:96-2.

U.S. Fish and Wildlife Service (USFWS). 2007. *Recovery Plan for the Carson Wandering Skipper* (Pseudocopaeodes eunus obscurus). June. Sacramento, CA: California/Nevada Operations Office.

U.S. Fish and Wildlife Service (USFWS). 2013. Designation of Critical Habitat for the Bi-State Distinct Population Segment of Greater Sage-Grouse; Proposed Rule. 78 *Federal Register* 64327. October 28.

U.S. Fish and Wildlife Service (USFWS). 2020a. *Bi-State Distinct Population Segment of Greater Sage-Grouse*. January. U.S. Fish and Wildlife Service Species Report.

U.S. Fish and Wildlife Service (USFWS). 2020b. *Monarch (*Danaus plexippus*) Species Status Assessment Report*. V2.1 96 pp. + appendices.

U.S. Fish and Wildlife Service (USFWS). 2021. Species status assessment report for *Eriogonum tiehmii* (Tiehm's buckwheat), Version 1.0. April. Sacramento, CA: Department of the Interior California – Great Basin Region.

U.S. Fish and Wildlife Service (USFWS). 2022a. *Hiko White River Springfish (*Crenichthys baileyi grandis*) and White River Springfish (*Crenichthys baileyi baileyi). July.

U.S. Fish and Wildlife Service (USFWS). 2022b. Endangered and Threatened Wildlife and Plants; Endangered Species Status and Designation of Critical Habitat for Tiehm's Buckwheat. Final Rule. (to be codified at 50 CFR Part 17). *Federal Register* Vol. 87, No. 241, Friday, December 16. 77368-77401.

U.S. Fish and Wildlife Service (USFWS). 2023. *IPaC Resource List of Federal Endangered and Threatened Species that Occur in or May Be Affected by the Project*. November 9. Reno, NV.

U.S. Geological Survey (USGS). 2023. *Watershed Boundary Dataset*. Available: https://www.usgs.gov/national-hydrography/watershed-boundary-dataset. Accessed: November 28, 2023.

Young, Craig D., and Thomas F. Bullard. 2019. *The Archaeological Implications of Desert Dust, Lincoln County, Nevada.* Report on file at Bureau of Land Management, Ely District Office, Ely, Nevada.

Zeier, Charles. 1996. *A Cultural Resources Action Plan for the Mineral Ridge Mining District, Esmeralda County, Nevada.* CR 6-1669, on file at the Bureau of Land Management, Battle Mountain District, Tonopah Field Office, Nevada.

APPENDIX A: SPECIAL STATUS SPECIES

Table A-1. Special Status Wildlife Species Occurring within the Carson City and Battle Mountain District Offices

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Amphibians		
Amargosa Toad	*Anaxyrus nelsoni*	BLM/–/–/ SGCN/G2,S2/Endemic
Columbia Spotted Frog (including Toiyabe spotted frog subpopulation)	*Rana luteiventris*	BLM/–/–/ SGCN/G4, S2/–
Dixie Valley Toad	*Anaxyrus williamsi sp. (Bufo williamsi)*	BLM/USFWS (E)/ SGCN/G1,S1/Endemic
Hot Creek Toad	*Anaxyrus nelsoni*	BLM/–/–/SGCN/G1,S1/Endemic
Northern Leopard Frog	*Lithobates pipiens*	BLM/–/ SGCN/G5, S2/–
Railroad Valley Toad	*Anaxyrus nevadensis*	BLM/–/–/SGCN/G1,S1/Endemic
Sierra Nevada Yellow-Legged Frog	*Rana sierra*	BLM/USFWS (E)/–/G2, SH/–
Western Toad	*Anaxyrus boreas*	BLM/–/–/SGCN/G4,S4/–
Birds		
Arizona Bell's Vireo	*Vireo bellii arizonae*	BLM/–/–/ SGCN/G5, S2B/–
Bald Eagle	*Haliaeetus leucocephalus*	BLM/USFWS Delisted 2009, BGEPA,MBTA/–/ SGCN, G5, S3/–
Bank Swallow	*Riparia riparia*	BLM/–/–/ SGCN/G5, S2B /–
Black Rosy-Finch	*Leucosticte atrata*	BLM/–/–/SGCN/G4, S2/–
Black-Chinned Sparrow	*Spizella atrogularis*	BLM/–/–/ SGCN/G5, S2S3/–
Black-Throated Gray Warbler	*Setophaga nigrescens*	BLM/–/–/ SGCN/G5, S3B /–
Bobolink	*Dolichonix oryzivorus*	–/BCC/–/–/
Brewer's Sparrow	*Spizella breweri*	BLM/ BLM/–/–/ SGCN/G5, S3B/–
Broad-Tailed Hummingbird	*Selasphorus platycercus*	BLM/–/–/–/G5, S3/–
Burrowing Owl (includes western burrowing owl)	*Athene cunicularia (a.c. hypugaea* Western Burrowing Owl*)*	BLM/–/–/SGCN/G4, S3B/–
Cassin's Finch	*Carpodacus cassinii*	–/BCC/–/ SGCN/G5, S3/–
Common Nighthawk	*Chordeiles minor*	BLM/–/–/ SGCN/G5, S3B/–
Crissal Thrasher	*Toxostoma crissale*	BLM/–/–/SGCN/G5, S3/–
Ferruginous Hawk	*Buteo regalis*	BLM/–/–/ SGCN/G4,S3B, S4N/–
Flammulated Owl	*Psiloscops flammeolus*	BLM/–/–/SGCN/G4, S3/–
Golden Eagle	*Aquila chrysaetos*	BLM/BGEPA,MBTA/–/–/ SGCN/G5, S4/–
Gray-Crowned Rosy-Finch	*Leucostcte tephrocots*	BLM/–/–/SGCN, G5, S2/–
Great Basin Willow Flycatcher	*Empidonax traillii adastus*	BLM/–/USFS (S)/–/SGCN, G5, S1B /–
Greater Sage-Grouse (including Bi-State DPS)	*Centrocercus urophasianus*	BLM/USFWS proposed (T)/–/ SGCN/G3, S3/–
Le Conte's Thrasher	*Taosostoma lecontei*	BLM/–/–/–/SGCN/G4, S2/–

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Least Bittern (includes western least bittern)	*Ixobrychus exilis;* includes *Ixobrychus exilis hesperis*	BLM/–/–/SGCN, G4, S2B/–
Lewis's Woodpecker	*Melanerpes lewis*	BLM/BCC/–/SGCN, G4, S2B/–
Loggerhead Shrike	*Lanius ludovicianus*	BLM/–/–/ SGCN, G4, S3/–
Long-Billed Curlew	*Numenius americanus*	BLM/–/–/SGCN, G5, S2/–
Long-Eared Owl	*Asio otus*	BLM/BCC/–/SGCN, G5, S3/–
Mountain Quail	*Oreortyx pictus*	BLM/–/–/SGCN, G5, S3/–
Northern Goshawk	*Accipiter gentilis*	BLM/–/USFS(S)/SGCN/G5, S3/–
Olive-Sided Flycatcher	*Contopus cooperis*	–/BCC/–/–/SGCN/G4, S2B/–
Peregrine Falcon	*Falco peregrinus*	BLM/ USFWS (delisted 1999)/USFS (S)/SGCN/ G4, S3/–
Phainopepla	*Phainopepla nitens*	BLM/–/–/–/G5, S3/–
Pinyon Jay	*Gymnorhinus cyanocephalus*	BLM/USFWS Under Review, BCC/–/SGCN/G3, S3
Ridgway's Rail (Yuma Clapper Rail)	*Rallus obsoletus yumanensis*	BLM/USFWS (E)/–/SGCN/G3, S1B/–
Sage Thrasher	*Oreoscoptes montanus*	BLM/BCC/–/SGCN/G4, S4B/–
Sagebrush Sparrow	*Artemisiospiza nevadensis*	BLM/BCC/–/ SGCN/G5, S3B, S4N/–
Scot's Oriole	*Icterus parisorum*	BLM/BCC/–/ SGCN/G5, S3, S4B /–
Short-Eared Owl	*Asio flammeus*	BLM/–/–/ SGCN, G5, S3/–
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	BLM/USFWS (E), CH/USFS (E)/ SGCN, G5, S1B/–
Swainson's Hawk	*Buteo swainsoni*	BLM/–/–/SGCN, G5, S3B/–
Verdin	*Auriparus flaviceps*	BLM/–/–/G5, S3/–
Virgina’s Warbler	*Vermivora virginiae*	–/BCC/–/SGCN, G5, S3/–
Western Snowy Plover (does not include the protected DPS found along the Pacific Coast)	*Charadrius nivosus nivosus*	BLM/–/–/ SGCN, G3, S3B/–
Yellow-Billed Cuckoo (including Western DPS)	*Coccyzus americanus oxidentalis*	BLM/USFWS (T, CH)/FWS (T)/ SGCN, G5, S1B /–
Fish		
Big Smoky Valley Speckled Dace	*Rhinichthys osculus lariversi*	BLM/–/–/ SGCN/G5, S1/Endemic
Big Smoky Valley Tui Chub	*Siphateles bicolor* ssp. 8	BLM/–/–/ SGCN/G4, S1/Endemic
Butterfield Spring Tui Chub	*Siphateles bicolor ssp.*	BLM/–/–/–/–/Endemic
Charnock Ranch Tui Chub (Charnock Springs tui chub)	*Siphateles bicolor* ssp. 10	BLM/–/–/–/G4, S1/Endemic
Cui-Ui	*Chasmistes cujus*	BLM/USFWS (E)/–/ SGCN/G1, S1/Endemic
Diamond Valley Speckled Dace	*Rhinichthys osculus ssp. 10*	BLM/–/–/ –/ G5, SH/Endemic
Dixie Valley Tui Chub	*Siphateles bicolor ssp. 9*	BLM/–/–/ –/ G4, S1 /Endemic
Fish Creek Springs Tui Chub	*Siphateles bicolor euchila*	BLM/–/–/ –/ SGCN/G4, S1/Endemic

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Fish Lake Valley Tui Chub	*Siphateles bicolor* ssp. 4	BLM/USFWS under review/–/ SGCN, G4, S1/ Endemic
Hiko White River Springfish	*Crenichthys baileyi grandis*	BLM/USFWS (EF)/–/NDOW (EF)/NS-S (S1); NS (G2T1)/ Endemic
Hot Creek Valley Tui Chub	*Siphateles bicolor* ssp. 5	BLM/–/–/–/ G4, S1/Endemic
Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*	BLM/USFWS (T)/USFS (T)/SGCN/ G5, S2/–
Little Fish Lake Valley Tui Chub	*Siphateles bicolor* ssp. 6	BLM/–/–/ SGCN/G4, S1/Endemic
Moapa Dace	*Moapa coriacea*	BLM/ USFWS (E)/–/SGCN/G1, S1/Endemic
Monitor Valley Speckled Dace	*Rhinichthys osculus* ssp 5	BLM/–/–/ SGCN,–/–
Mountain Whitefish	*Prosopium williamsoni*	BLM/–/–/ SGCN/G5, S3/–
Oasis Valley Speckled Dace	*Rhinichthys osculus* ssp. 6	BLM/–/–/NDOW (SF)/NS-S (S1)/NS (G5T1)
Railroad Valley Springfish	*Crenichthys nevadae*	BLM/USFWS (T), CH/–/SGCN/G1, S1/Endemic
Railroad Valley Tui Chub	*Siphateles bicolor* ssp. 7	BLM/–/–/ SGCN/G4, S1/Endemic
Crustaceans		
Side Hill Spring Amphipod	*Hyalella azteca sp. 26*	BLM/–/–/ –/–/Endemic
Ostracod Sp.	*Thermopsis thermophila*	BLM/–/–/ –/–/Endemic
Mammals		
Allen's Big-Eared Bat	*(Allen's lappet-browned bat) Idionycteris phyllotis*	BLM/–/–/SGCN/G4, S1/–/WBWG (high)
American Pika	*Ochotona princeps*	BLM/–/–/SGCN/G5, S2/–
Belted Range Pocket Gopher	*Thomomys bottae nanus*	BLM/–/–/–/–/Endemic
Big Free-Tailed Bat	*Nyctinomops macrotis*	BLM/–/–/ SGCN/G5, S1/–
Bighorn Sheep (California, Desert, Rocky Mountain subspecies)	*Ovis canadensis spp.*	BLM/–/desert bighorn sheep USFS (S)/SGCN/G4, S3S4/–
Brazilian (or Mexican) Free-Tailed Bat	*Tadarida brasiliensis*	BLM/–/–/NDOW (PM); NS-S (S3S4B); NS (G5)
California Myotis	*Myotis californicus*	BLM/–/–/–/G5, S3S4/–
Canyon Bat (Formerly Western Pipestrelle)	*Parastrellus hesperus*	BLM/–/–/SGCN/G5, S3S4/–
Cave Myotis	*Myotis velifer*	BLM/–/–/SGCN/G4, S1/–
Eastgate Pocket Gopher	*Thomomys bottae lucrificus*	BLM/–/–/SGCN/–/Endemic
Dark Kangaroo Mouse (includes Desert Valley kangaroo mouse and Fletcher dark kangaroo mouse *M. M. Albiventer* and *Nasutus*)	*Microdipodops megacephalus* ssp.	BLM/–/–/SGCN/G4, S2/Endemic
Desert Kangaroo Rat	*Dipodomys deserti*	BLM/–/USFS (S)/SGCN/G5, S2S3/–
Dixie Valley Pocket Gopher	*Thomomys bottae depressus*	BLM/–/–/–/–/Endemic
Fish Lake Valley Pocket Gopher	*Thomomys bottae lacrymalis*	BLM/–/–/–/–/Endemic

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Fish Springs Pocket Gopher	*Thomomys bottae abstrusus*	BLM/–/–/–/–/Endemic
Fringed Myotis	*Myotis thysanodes*	BLM/–/USFS (S)/SGCN/G4/–
Greater Bonneted Bat	*Eumops perotis*	BLM/–/?/ SGCN/G4, S1/–/
Greater Western Mastiff Bat	*Eumops perotis*	BLM/–/–/NDOW (PM)/NS-S (S1); NS (G5G4)
Hoary Bat	*Lasiurus cinereus*	BLM/–/–/SGCN/G3, S2S3/–
Inyo Shrew	*Sorex tenellus*	BLM/–/–/SGCN/G4, S2/–
Kawich Pocket Gopher	*Thomomys bottae brevidens*	BLM/–/–/–/–/Endemic
Little Brown Bat	*Myotis lucifugus*	BLM/–/–/SGCN/G3,S2S3/–
Long-Eared Myotis	*Myotis evotis*	BLM/–/–/–/G5, S3/–
Long-Legged Myotis	*Myotis volans*	BLM/–/–/SGCN/G4, S3S4/–
Merriam's Shrew	*Sorex merriami*	BLM/–/–/SGCN/G4, S3/–
Mexican Free-Tailed Bat	*Tadarida brasiliensis*	BLM/–/–/SGCN/G5, S4/–/
Monitor Valley Desert Pocket Gopher	*Thomomys bottae concisor*	BLM/–/–/–/–/Endemic
Moores Creek Pocket Gopher	*Thomomys bottae depressus*	BLM/–/–/–/–/Endemic
Northern River Otter	*Lontra canadensis pacifica*	BLM/–/–/–/G5, S2/–
Pahranagat Valley Montane Vole	*Microtus montanus fucosus*	BLM/–/–/NDOW (PM); NS-S (S1S2); NS (G5T2)
Pale Kangaroo Mouse	*Microdipodops pallidus*	BLM/–/–/SGCN/–/Endemic
Pallid Bat	*Antrozous pallidus*	BLM/–/ USFS (S)/SGCN/G4, S3/–
Panamint Kangaroo Rat	*Dipodomys panamintinus*	BLM/–/–/SGCN/G5, S4/–
Pocket Gopher (Includes Botta's [*Thomomys botae]*; Fish Spring pocket gopher (*T. B. abstrusus*) and San Antonio pocket gopher (*T. B. curatus*)	*Thomomys bottae*	BLM/–/–/Botta's NS-S (SNR); NS (G5); Fish Springs and San Antonio (NS-S (SH); NS (G5TH)
Pygmy Rabbit	*Brachylagus idahoensis*	BLM/–/USFS (S)/SGCN/G4, S3/–
San Antonio Pocket Gopher	*Thomomys bottae curtatus*	BLM/–/–/SGCN/NH, SH/Endemic
Silver-Haired Bat	*Lasionycteris noctivagans*	BLM/–/–/ SGCN/G3, S3/–
Smoke Creek Desert Pocket Gopher	*Thomomys bottae canus*	BLM/–/–/–/–/Endemic
Spotted Bat	*Euderma maculatum*	BLM/–/USFS (S)/SGCN/G4, S2/–
Stewart Valley Pocket Gopher	*Thomomys bottae solitarius*	BLM/–/–/–/–/Endemic
Townsend's Big-Eared Bat	*Corynorhinus townsendii*	BLM/–/USFS (S)/ SGCN/G4, S2/–
Walker River Desert Pocket Gopher	*Thomomys bottae cinereus*	BLM/–/–/–/–/Endemic
Western Jumping Mouse	*Zapus princeps*	BLM/–/–/ SGCN/G5, S2/Endemic
Western Red Bat	*Lasiurus blossevillii*	BLM/–/–/ SGCN/G4, S2/–
Western Small-Footed Myotis	*Myotis ciliolabrum*	BLM/–/–/SGCN/G5, S3S4/–

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Western Water Shrew	*Sorex navigator*	BLM/–/USFS (S)/SGCN/G5, S2/–
Yuma Myotis	*Myotis yumanensis*	BLM/–/–/SGCN/G5, S3/–
Reptiles		
Greater Short-Horned Lizard	*Phrynosoma hernandesi*	BLM/–/–/–/NS-S (S3/4)
Mojave Desert Tortoise	*Gopherus agassizii*	BLM/USFWS (T)/TR/–/USFS (T); FWS (T); NDOW (TR); NS-S (S2S3); NS (G3)
Northern Rubber Boa	*Charina bottae*	BLM/–/–/SGCN/G5, S3/–
Pygmy Short-Horned Lizard	*Phrynosoma douglassii*	BLM/–/–/–/NS-S (SNR); NS (G5)
Ring-Necked Snake	*Diadophis punctatus*	BLM/–/–/SGCN/G5, S3/–
Sierra Alligator Lizard	*Elgaria coerulea palmeri*	BLM/–/–/–/NDOW (PR); NS-S (S2S3); NS (G5T4)
Western (Northwestern) Pond Turtle	*Actinmys marmorata*	BLM/–/–/SGCN/G3, S2/–
Insects		
American Bumble Bee	*Bombus pensylvanicus*	BLM/–/–/–/–/G3, S3/–
Apache Silverspot Buterfly	*Argynnis nokomis apacheana*	BLM/–/–/–/G3, S3/–
Big Smoky Wood Nymph	*Cercyonis oetus alkalorum*	BLM/–/–/–/G5, S1/Endemic
Carson Valley Sandhill Skipper	*Polites sabuleti genoa*	BLM/–/–/–/G5, S1/Endemic
Carson Valley Silverspot	*Speyeria nokomis carsonensis*	BLM/–/–/–/G3, S3/–
Carson Wandering Skipper	*Pseudocopaeodes eunus obscurus*	BLM/USFWS(E)–/ SGCN/G5, S1/–
Carson Valley Wood Nymph	*Cercyonis pegala carsonensis*	BLM/–/–/–/SGCN/G5, S2/Endemic
Crescent Dunes Aegialian Scarab	*Aegialia crescenta*	BLM/–/–/–/–/Endemic
Crescent Dunes Aphodius Scarab	*Aphodius* sp. 2	BLM/–/–/–/G1, S1/Endemic
Crescent Dunes Serican Scarab	*Serica ammomenisco*	BLM/–/–/–/G1, S1/Endemic
Dark Sandhill Skipper	*Polites sabuleti nigrescens*	BLM/–/–/–/G5, S3/Endemic
Darkling Beetle Sp.	*Eleodes inornata*	BLM/–/–/–/–/Endemic
Darkling Beetle Sp.	*Neobaphion papula*	BLM/–/–/–/–/Endemic
Dune Honey Ant	*Myrmecocystus arenarius*	BLM/–/–/–/G2, S2/Endemic
Early Blue	*Euphilotes enoptes primavera*	BLM/–/–/–/ G5, S1/Endemic
Fused Batoides Blue	*Euphilotes battoides fusimaculata*	BLM/–/–/–/G5, S1/Endemic
Great Basin Small Blue	*Philotiella speciosa septentrionalis*	BLM/–/–/–/ G3, S1/Endemic
Great Basin Yuma Skipper	*Ochlodes yuma lutea*	BLM/–/–/–/G4, S2/Endemic
Hardy's Aegialian Scarab	*Aegialia hardyi*	BLM/–/–/–/–/Endemic

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
Honey Lake Blue	*Euphilotes pallescens calneva*	BLM/–/–/SGCN/G3, S1/–
Humboldt Aphodius Beetle	*Dellacasiellus humboldti*	BLM/–/–/–/–/Endemic
Inyo Mountains Blue	*Euphilotes bernardino inyomontana*	BLM/–/–/–/–/Endemic
Lahontan Aphodius Scarab	*Stenotothorax lahontanensis*	BLM/–/–/–/G4, S1/Endemic
Mojave Gypsum Bee	*Andrena balsamorhizae*	BLM/–/–/–/ SGCN/G2, S1/–
Mojave Poppy Bee	*Perdita meconis*	BLM/Under Review/–/–/NS-S (S2); NS (G2)
Monarch Butterfly	*Danaus plexippus plexippus*	BLM/USFWS Candidate 2020)/–/SGCN/G4, S3/ –
Mono Basin Skipper	*Hesperia uncas giulianii*	BLM/–/–/–/NS-S (S1); NS (G5T1)
Mono Checkerspot	*Euphydryas editha monoensis*	BLM/–/–/–/–/G5, S1/–
Nevada Alkali Skipperling	*Pseudocopaeodes eunus flavus*	BLM/–/–/–/G3, S1/–
Nevada Viceroy	*Limenitis archippus lahontani*	BLM/–/–/–/–/G5, S1/Endemic
Nye County Army Ant	*Neivamyrmex nyensis*	BLM/–/–/–/–/G1, S1/–
Pahranagat Naucorid Bug	*Pelocoris shoshone shoshone*	BLM/–/–/–/NS-S (S1); NS (G1G3T1)
Pallid Blue Subspecies Confusa	*Euphilotes pallescens confusa*	BLM/–/–/–/–/G3, S1/–
Pallid Skipper	*Polites sabuleti basinensis*	BLM/–/–/–/–/G5, S2/Endemic
Pallid Sylvinus Hairstreak	*Satyrium sylvinus megapallidum*	BLM/–/–/–/–/G3/–
Pallid Wood Nymph	*Cercyonis oetus pallescens*	BLM/–/–/–/–/G5, S1/Endemic
Peavine Blue	*Euphilotes enoptes aridorum*	BLM/–/–/–/–/G5, S1/Endemic
Railroad Valley Skipper	*Hesperia uncas fulvapalla*	BLM/–/–/–/SGCN/G4, S1/Endemic
Reese River Railroad Valley Skipper	*Hesperia uncas reeseorum*	BLM/–/–/–/G4, S1/Endemic
Rim Lichen	*Aspicilia rogeri*	BLM/–/–/–/–/G2, S1/–
Sand Mountain Aphodius Scarab	*Aphodius* sp. 3	BLM/–/–/–/ –/Endemic
Sand Mountain Blue	*Euphilotes pallescens arenamontana*	BLM/–/–/–/NS-S (S1); NS (G3G4T1)
Sand Mountain Pygmy Scarab	*Coenonycha pygmaea*	BLM/–/–/–/G3, SNR/Endemic
Sand Mountain Serican Scarab	*Serica psammobunus*	BLM/–/–/–/G1, S1/Endemic
Washoe Stonefly	*Sierracapnia washoe*	BLM/–/–/–/GNR, S1/Endemic
Western Bumble Bee	*Bombus occidentalis*	BLM/–/–/–/SGCN/G3, SNR/–
White Mountains Skipper	*Hesperia miriamae longaevicola*	BLM/–/–/–/NS-S (S1); NS (G2G3T1T2)
White River Valley Skipper	*Hesperia uncas grandiosa*	BLM/–/–/–/–/G4, S1/Endemic

Common Name	Scientific Name	Status (BLM/USFWS/USFS/State/Global, State Rank/State Endemic
White River Wood Nymph	*Cercyonis pegala pluvialis*	BLM/–/–/–/–/G5, S2/–
Mollusks and Gastropods		
Black-Footed Tightcoil	*Pristiloma chersinella*	BLM/–/–/–/–/ G3, S3/–
Great Basin Mountainsnail	*Oreohelix strigose depressa*	BLM/–/–/–/–/ G5, S1 /–
California Floater	*Anodonta californiensis*	BLM/–/–/SGCN/G3, S1/–
Carinate Duckwater Pyrg	*Pyrgulopsis carinata*	BLM/–/–/–/NS-S (S1); NS (G1)
Dixie Valley Pyrg	*Pyrgulopsis dixensis*	BLM/–/–/–/NS-S (S1); NS (G1)
Duckwater Pyrg	*Pygulopsis aloba*	BLM/–/–/–/NS-S (S1); NS (G1)
Duckwater Warm Springs Pyrg	*Pyrgulopsis villacampae*	BLM/–/–/–/NS-S (S1); NS (G1)
Elongate Cain Spring Pyrg	*Pyrgulopsis augustae*	BLM/–/–/–/–/SGCN/G1, S1/Endemic
Fish Lake Valley Pyrg	*Pyrgulopsis ruinosa*	BLM/–/–/–/–/SGCN/GX, S1/Endemic
Great Basin Mountainsnail	*Oreohelix strigose depressa*	BLM/–/–/–/–/G5, S1/–
Large-Gland Carico Pyrg	*Pyrgulopsis basiglans*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Lockes Pyrg	*Pyrgulopsis lockensis*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Monitor Tryonia	*Tryonia monitorae*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Oasis Valley Pyrg	*Pyrgulopsis micrococcus*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Ovate Cain Spring Pyrg	*Pyrgulopsis pictilis*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Pyramid Lake Pebblesnail	*Fluminicola dalli*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Sada's Pyrg	*Pyrgulopsis sadai*	BLM/–/–/–/ SGCN/G2, S1/Endemic
Shasta Pebblesnail	*Fluminicola multifarius*	BLM/–/–/–/ SGCN/ G2, SNR/Endemic
Southern Duckwater Pyrg	*Pyrgulopsis anatina*	BLM/–/–/–/NS-S (S1); NS (G1)
Sterile Basin Pyrg	*Pyrgulopsis sterilis*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Surprise Valley Pyrg	*Pyrgulopsis gibba*	BLM/–/–/–/ SGCN/G1, S1/–
Turban Pebblesnail	*Fluminicola turbiniformis*	BLM/–/–/–/ SGCN/G3, S3/–
Virginia Mountains Pebblesnail	*Fluminicola virginius*	BLM/–/–/–/ SGCN/G1, S1/Endemic
Western Lahontan Pyrg	*Pyrgulopsis longiglans*	BLM/–/–/SGCN/G2, S2/Endemic
Western Pearlshell	*Margaritifera falcata*	BLM/–/–/SGCN/G5, S1/Endemic
Western Ridged Mussel	*Gonidea angulata*	BLM/USFWS Under Review/–/ SGCN/G3, S1/–
Whitepine Mountainsnail	*Oreohelix hemphilli*	BLM/–/–/–/ –/G2, S2 /–
Wongs Pyrg	*Pyrgulopsis wongi*	BLM/–/–/–/ SGCN/G2, S1/Endemic

Informaton on Designation and Rankings and Habitat from the 2017 BLM Nevada Sensitive and Special Status List
Conservaton Rank Definitons (NatureServe)
NS-S = State rank; NS = Global rank
NS-G = refers to the global population of a species
NS-S = refers to the subnational (State) population of a species, subspecies, or variety
NS-T = refers to the subspecific or variety taxonomic level (used in conjunction with G rank);
NS-X = presumed extinct or extirpated (S rank)
NS-H = P
1 = ***Critically Imperiled*** - at very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors
2 = ***Imperiled*** - at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors
3 = ***Vulnerable*** - at moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors

S#S#, G#G3 = Range Rank - a numeric range rank (e.g., S2S3 or G1G3) is used to indicate uncertainty about the exact status of a taxon. Ranges cannot skip more than two ranks (e.g., S1S4 is not permissible).
NR = rank not yet assessed
U = unrankable - currently unrankable due to lack of information or due to substantially conflicting information about status or trends
Q = questionable taxonomy - taxonomic distinctiveness of the entity at the current level is questionable or currently being reviewed; resolution of this uncertainty may result in change from a species to a subspecies, variety or hybrid, or the inclusion
US Fish and Wildlife Service (USFWS) Listing
E = Endangered - in danger of extinction in all or a significant portion of the range T = Threatened - likely to be classified as Endangered in the foreseeable future if threats continue C = Candidate for listing as Threatened or Endangered
US Forest Service (USFS) Listing
S = Sensitive or Watch List in either Region 4 (Humboldt-Toiyabe National Forest) or Region 5 (Lake Tahoe Basin Management Unit)
Nevada Department of Wildlife (NDOW) - State of Nevada Protection and Designations (NAC 503) 2023 July
GF = game fish
PF or P = protected fish
SF or S = Sensitive fish
TF or T = Threatened fish
EF or E = Endangered fish
PA or P = protected amphibian
PR or P = protected reptile
TR or T = Threatened reptile
GB = game bird
PB or P = protected bird
SB or S = Sensitive bird
EB or E = Endangered bird
GM = game mammal
FM = fur-bearing mammal
PM or P = protected mammal
SM or S = Sensitive mammal
TM or T = Threatened mammal
Western Bat Working Group (WBWG) Regional Bat Species Priority Matrix
high = based on available information on distribution, status, ecology, and known threats, this designation should result in these species being considered the highest priority for funding, planning, and conservation actions. Information about status and threats to most species could result in effective conservation actions being implemented should a commitment to management exist. These species are imperiled or are at high risk of imperilment
medium = this designation indicates a level of concern that should warrant closer evaluation, more research, and conservation actions of both the species and possible threats. A lack of meaningful information is a major obstacle in adequately assessing these species' status and should be considered a threat
low = this designation indicates that most of the existing data support stable populations of the species, and that the potential for major changes in status in the near future is considered unlikely. While there may be localized concerns, the overall status of the species is believed to be secure.

Table A-2. BLM Sensitive Plants Potentially Occurring in the Nominated ACEC

Common Name	Scientific Name	Federal Listing and Critical Habitat Status*	State Listed Status, Global Rank, State Rank*
Alexander's Buckwheat	*Eriogonum alexanderae*	–	–, G5, S2
Altered Andesite Buckwheat	*Eriogonum robustum*	–	–, G2, S2
Altered Andesite Popcornflower	*Plagiobothrys glomeratus*	–	–, G2, S2
Ames' Milkvetch	*Astragalus pulsiferae* var. *pulsiferae*	–	–, G4T2, S1
Ash Meadows Ladies Tresses	*Spiranthes infernalis*	–	–, G2, S1
Ash Meadows Mousetails	*Ivesia kingii* var. *eremica*	Threatened, Critical Habitat	Fully Protected, G4T1, S1
Ash Meadows Sunray	*Enceliopsis nudicaulis var. corrugata*	Threatened, Critical Habitat	Fully Protected, GT15, S1
Beatley's Buckwheat	*Eriogonum beatleyae*	–	–, G3, S3
Black Woollypod	*Astragalus funereus*	–	–, G2, S2
Blaine Fishook Cactus	*Sclerocactus blainei*	–	–, G1, S1
Bodie Hills Rockcress	*Boechera bodiensis*	–	–, G3, S2
Bristlecone Pine	*Pinus longaeva*	–	–, G4, S3
Broad-pod Freckled Milkvetch	*Astragalus lentiginosus* var. *latus*	–	–, G5T2, S2
Bullfrog Hills Sweetpea	*Lathyrus hitchcockianus*	–	–, G2, S2
Callaway Milkvetch	*Astragalus callithrix*	–	–, G3, S3
Candelaria Blazingstar	*Mentzelia candelariae*	–	–, G3, S3
Carson Valley Monkeyflower	*Erythranthe carsonensis*	–	–, G2, S2
Churchill Narrows Buckwheat	*Eriogonum diatomaceum*	–	Fully Protected, G1, S1
Cima Milkvetch	*Astragalus cimae* var. *cimae*	–	–, G3T3, S1
Clarke Phacelia	*Phacelia filiae*	–	–, G3, S3
Clokey Cryptantha	*Cryptantha clokeyi*	–	–, G3, S1
Currant Milkvetch	*Astragalus uncialis*	–	–, G2, S2
Dainty Moonwort	*Botrychium crenulatum*	–	–, G4, S2
Dune Sunflower	*Helianthus deserticola*	–	–
Eastwood's Milkweed	*Asclepias eastwoodiana*	–	–, G2, S2S3
Elko Rockcress	*Boechera falcifructa*	–	–, G1, S1
Granite Serpentweed	*Tonestus graniticus*	–	–, G1, S1
Holmgren's Lupine	*Lupinus holmgrenianus*	–	–, G2, S2
Inyo Blazingstar	*Mentzelia inyoensis*	–	–, G2, S1
Kawich Range Beardtongue	*Penstemon pudicus*	–	–, G1, S1
Lahontan Beardtongue	*Penstemon palmeri* var. *macranthus*	–	–, G4T2, S2
Lahontan Indigobush	*Psorothamnus kingii*	–	–, G3, S3
Lahontan Milkvetch	*Astragalus porrectus*	–	–, G3, S3
Lavin Milkvetch	*Astragalus oophorus* var. *lavinii*	–	–, G4T2, S2
Least Phacelia	*Phacelia minutissima*	–	–, G3, S3

Common Name	Scientific Name	Federal Listing and Critical Habitat Status*	State Listed Status, Global Rank, State Rank*
Lemmon Buckwheat	*Eriogonum lemmonii*	–	–, G3, S3
Limestone Monkeyflower	*Erythranthe calcicola*	–	–, G3, S1
Low Feverfew	*Parthenium ligulatum*	–	–, G3, S1
Lunar Crater Buckwheat	*Johanneshowellia crateriorum*	–	–, G1, S1
Maquire's Lewisia	*Lewisia maguirei*	–	–, G2, S2
Margaret's Rushy Milkvetch	*Astragalus convallarius* var. *margaretiae*	–	–, G5T2, S2
Meadow Milkvetch	*Astragalus diversifolius*	–	–, G2, S1
Mojave Fishhook Cactus	*Sclerocactus polyancistrus*	–	–, G3, S2
Mojave Thistle	*Cirsium mohavense*	–	–, G3, S3
Mono County Phacelia	*Phacelia monoensis*	–	–, G3, S2
Monte Neva Paintbrush	*Castilleja salsuginosa*	–	Fully Protected, G1, S1
Needle Mountains Milkvetch	*Astragalus eurylobus*	–	–, G2, S2
Nevada Dune Beardtongue	*Penstemon arenarius*	–	–, G2, S2
Nevada Oryctes	*Oryctes nevadensis*	–	–, G3, S2
Nevada Suncup	*Eremothera nevadensis*	–	–, G3, S3
Nevada Willowherb	*Epilobium nevadense*	–	–, G3, S2
Nye County Fishook Cactus	*Sclerocactus nyensis*	–	–, G1, S1
Nye County Smelowskia	*Nevada holmgrenii*	–	–, G3, S3
Nye Milkvetch	*Astragalus nyensis*	–	–, G3, S3
One-leaflet Torrey's Milkvetch	*Astragalus calycosus* var. *monophyllidius*	–	–, G5T2, S3
Pahute Green Gentian	*Frasera pahutensis*	–	–, G3, S3
Pahute Mesa Beardtongue	*Penstemon pahutensis*	–	–, G3, S3
Pine Nut Mountains Mousetails	*Ivesia pityocharis*	–	–, G1, S1
Playa Phacelia	*Phacelia inundata*	–	–, G3, S2
Railroad Valley Globemallow	*Sphaeralcea caespitosa* var. *williamsiae*	–	–, G2T2, S2
Reese River Phacelia	*Phacelia glaberrima*	–	–, G3, S3
Sagebrush Cholla	*Opuntia pulchella*	–	–, G3, S3
Sagebrush Pygmyleaf	*Loeflingia squarrosa* ssp. *artemisiarum*	–	–, G5T3, S1
Sanicle Biscuitroot	*Cymopterus ripleyi* var. *saniculoides*	–	–, G3, S3
Schoolcraft's Slender Buckwheat	*Eriogonum microtheca* var. *schoolcraftii*	–	–, G5T3, S1
Short-pedicel Monkeyflower	*Erythranthe brachystylis*	–	–, G1, S1
Sierra Valley Mousetails	*Ivesia aperta var. aperta*	–	–, G2T2, S1
Sodaville Milkvetch	*Astragalus lentiginosus* var. *sesquimetralis*	–	Fully Protected, G5T1, S1
Soft Lupine	*Lupinus malacophyllus*	–	–, G3, S3
Spjut Bristlemoss	*Orthotrichum spjutii*	–	–, G1, S1
Starcup	*Gymnosteris nudicaulis*	–	–, G4, S2

Common Name	Scientific Name	Federal Listing and Critical Habitat Status*	State Listed Status, Global Rank, State Rank*
Steamboat Buckwheat	*Eriogonum ovalifolium* var. *williamsiae*	Endangered	Fully Protected, G5T1, S1
Steamboat Monkeyflower	*Diplacus ovatus*	–	–, G2, S2
Talapoosa Peak Pearpod	*Stroganowia tiehmii*	–	–, G2, S2
Tecopa Salty Bird's-Beak	*Chloropyron tecopense*	–	–, G2, S2
Thickleaf Pepperweed	*Lepidium integrifolium*	–	–, G2, S1
Tiehm's Beardtongue	*Penstemon tiehmii*	–	–, G1, S1
Tiehm's Blazingstar	*Mentzelia tiehmii*	–	–, G2, S2
Tiehm's Buckwheat	*Eriogonum tiehmii*	Endangered, Critical Habitat	–, G1, S1
Toiyabe Springparsley	*Cymopterus goodrichii*	–	–, G2, S2
Tonopah Milkvetch	*Astragalus pseudiodanthus*	–	–, G3, S2
Toquima Milkvetch	*Astragalus toquimanus*	–	–, G2, S2
Washoe Pine	*Pinus ponderosa* var. *washoensis* [*P. washoensis*]	–	–, G3, S2
Wassuk Beardtongue	*Penstemon rubicundus*	–	–, G2, S3
Watson's Spinecup	*Oxytheca watsonii*	–	–, G3, S3
Webber's Ivesia	*Ivesia webberi*	Threatened, Critical Habitat	Fully Protected, G2, S2
West Humboldt Buckwheat	*Eriogonum anemophilum*	–	–, G3, S3
Western Joshua Tree	*Yucca brevifolia*	–	–, G3, S3
Whitebark Pine	*Pinus albicaulis*	Threatened	–, G3, S3
Williams Combleaf	*Polyctenium williamsiae*	–	Fully Protected, G2, S2
Winged Milkvetch	*Astragalus pterocarpus*	–	–, G3, S3

List is from BLM's 2023 updated *Nevada Special Status Species List* (BLM 2023).

State of Nevada Agency Listing Definition:

Fully Protected = NRS 527.050, 527.300 - Species determined as critically Endangered species of native flora by the Nevada Division of Forestry, these species may not be removed or destroyed unless issued a permit by the Nevada State Forester.

NatureServe Ranks:

Below are the Global Rank (G) and State Rank (S) and Trinomial Rank (T) definitions from the NatureServe website. Global refers to the known global population, State refers to state (Nevada), and Trinomial refers to the global rank of a variety or subspecies.

G1 & T1 = Critically imperiled; at very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.

G2 & T2 = Imperiled; at high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

G3 & T3 = Vulnerable; at moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

G4 = Apparently secure; at fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

G5 = Secure; at very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

S1 = Critically imperiled; at very high risk of extirpation in the jurisdiction due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors.

S2 = Imperiled; at high risk of extirpation in the jurisdiction due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 = Vulnerable; at moderate risk of extirpation in the jurisdiction due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
Federal listing status under the Endangered Species Act (ESA), determined by the US Fish and Wildlife Service:
– = not listed
Endangered = Listed by the USFWS as Endangered under the ESA as a species which is in danger of extinction throughout all or a significant portion of its range
Threatened = Listed by the USFWS as Threatened under the ESA as a species which is likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

Appendix D
List of Preparers

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Appendix D. List of Preparers

Table D-1. BLM Interdisciplinary Team

Name	Title and/or Document Area of Responsibility
Scott Distel	Project Manager
Greg Helseth	Renewable Energy Branch Chief, BLM Nevada State Office
Frank Giles	Air Quality/Climate Change; Noise
Gabrielle Buttermore	Wildlife
Thomas Mendoza	Rangeland – Grazing Management, Soils, and Vegetation
Tim Van der Voort	Cultural Resources, Native American Concerns, and Paleontological Resources
Melissa Jennings	Hydrologic Resources; Geology and Minerals
Jeremiah Kendall	Lands, Realty, and Cadastral Survey
Kenner Elena Vorheis	Lands and Wilderness Characteristics; Visual Resources, including Night Skies
Robert Burdick	Forestry
Kenner Vorheis	Recreation
Matt Fockler	Social Values, Economics Conditions, and EJ
Jeremiah Kendall	Transportation, Access, and Public Safety
Jensen Reese	Wastes and Materials
Brianna Brodowski	Wild Horses and Burros

Table D-2. Environmental Management and Planning Solutions LLC (EMPS)

Name	Title and/or Document Area of Responsibility
Jennifer Thies	Project Manager/NEPA Lead
Sean Cottle	Assistant Project Manager
Amy Cordle	Supplemental Information Reports and Supplemental Environmental Reports Lead
Marcia Rickey	GIS/Data Management Lead
Chelsea Ontiveros	GIS/Data Specialist
Bill Bicknell	Contract/Subcontractor Management
Zoe Ghali	EJ Lead
Josh Schnabel	EJ and Economic Values
Clayton McGee	Lands, Realty, and Cadastral Survey; Comment Analysis
Kirsten Davis	Travel and Transportation; Soils
Theresa O'Halloran	Water Resources
Tom Whitehead	Water Resources
Val Stanson	Wastes and Materials; Public Safety
Francis Craig	Reasonably Foreseeable Development Scenario Lead; Geology and Minerals
Cortney Luxford	Geology and Minerals
Derek Holmgren	Visual Resources Lead; Recreation
Erin Hudson	Cultural Resources and Native American Concerns
Perry Lown	Paleontological Resources
Meredith Linhoff	Biological Wildlife Resource Lead
Morgan Trieger	Botanical Resources – Vegetation, Noxious Weeds, and Invasive Species; Forestry
Rachel Redding	Wildlife and Aquatic Biota; Special Status Species

Name	Title and/or Document Area of Responsibility
Emma Davis	Lands with Wilderness Characteristics
Lily Benson	Noise
Liza Schill	Rangeland – Grazing Management; Wild Horses and Burros; Administrative Record/Decision File Lead
Andy Spellmeyer	Rangeland – Grazing Management; Wild Horses and Burros
David Jaeger	Recreation
Cindy Schad	Word Processor
Trinity Consultants (Subcontractor to EMPS)	
David Strohm	Air Quality and Climate
Truescape (Subcontractor to EMPS)	
Elliot Payne	Visual Simulations
ASM Affiliates (Subcontractor to EMPS)	
Ed Stoner	Cultural Resources and Native American Concerns