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

Lava Ridge Wind Project

Final Environmental Impact Statement

June 2024

VOLUME 1

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Estimated Total Cost to Develop and Produce this EIS: $6,564,167

Prepared by:

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

In Cooperation with:

National Park Service
U.S. Army Corps of Engineers
U.S. Fish and Wildlife Service
State of Idaho
Jerome County
Lincoln County
Minidoka County

Mission

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.

U.S. Department of the Interior
Bureau of Land Management
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Shoshone, Idaho 83352

DOI-BLM-ID-T030-2021-0015-EIS

LAVA RIDGE WIND PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

Bureau of Land Management Responsible Official, Lead Agency	Codie Martin, Shoshone Field Manager
Cooperating Agencies	National Park Service U.S. Army Corps of Engineers U.S. Fish and Wildlife Service State of Idaho Jerome County, Idaho Lincoln County, Idaho Minidoka County, Idaho
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Abstract: Magic Valley Energy, LLC (MVE), is seeking authorization to use Bureau of Land Management (BLM) public lands in southern Idaho to construct, operate and maintain, and decommission the Lava Ridge Wind Project (the project). The project as proposed would consist of up to 400 wind turbines and associated infrastructure, including new and improved roads, powerlines for collection and transmission of electricity, substations, operation and maintenance facilities, and a battery storage facility. The project would have a generation capacity of 1,000 megawatts or more. The final environmental impact statement (EIS) analyzes the following six alternatives:

- Alternative A – No Action, in which the BLM would not authorize construction, operation and maintenance, and decommissioning of the project
- Alternative B – Proposed Action, which as described by MVE would span 197,474 acres and would have a maximum of 400 wind turbines
- Alternative C – Reduced Western Corridors, which has a project area of 146,389 acres and a maximum of 378 wind turbines
- Alternative D – Centralized Corridors, which has a project area of 110,315 acres and a maximum of 280 wind turbines
- Alternative E – Reduced Southern Corridors, which has a project area of 122,444 acres and a maximum of 269 wind turbines
- Preferred Alternative – This alternative has a project area of 103,864 acres and a maximum of 241 wind turbines. The BLM identified a Preferred Alternative that combines elements of Alternatives B, C, D, and E, which the BLM examined in the draft EIS. The Preferred Alternative responds to resource impact concerns raised by cooperating agencies and the public through comments on the draft EIS.

Public comments on the draft EIS were accepted through April 20, 2023. The *Summary of Public Comments on the Draft Environmental Impact Statement* is provided as Appendix 14 to this final EIS.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Shoshone Field Office
400 West F Street
Shoshone, Idaho 83352-5284
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Dear Reader:

Enclosed for your review is the final environmental impact statement (EIS) for the Lava Ridge Wind Project (project). This final EIS was prepared by the U.S. Department of the Interior, Bureau of Land Management (BLM), pursuant to the Federal Land Policy and Management Act of 1976 and the National Environmental Policy Act of 1969.

Magic Valley Energy, LLC (the Applicant), submitted an application to the BLM Shoshone Field Office on February 21, 2020, to request a right-of-way on public lands. The project would consist of up to 400 wind turbines and associated infrastructure, including new and improved roads, powerlines for collection and transmission of electricity, substations, operation and maintenance facilities, and a battery storage facility. The project's 500-kilovolt transmission line would interconnect at Idaho Power Company's existing Midpoint Substation or at a new substation within the right-of-way corridor of the northern part of the Southwest Intertie Project.

In preparing this EIS, the BLM developed a range of alternatives to address resource conflicts by considering 1) issues raised through the public scoping period and consultation and coordination with participating and cooperating agencies and American Indian Tribes, 2) issues raised by agency resource specialists, and 3) applicable planning criteria. In the draft EIS, the BLM identified three alternatives to analyze in detail in addition to the Proposed Action and No Action alternatives.

The BLM released the draft EIS for public comment from January 20 through April 20, 2023. Responses to public comment are detailed in EIS Appendix 14. Key changes reflected in this final EIS include the following:

- In response to the Consolidated Appropriations Act, 2024 (Public Law No. 118-42, Section 441), the BLM held additional meetings to consult with stakeholders, local elected officials, and state agencies on the project. These meetings were in addition to the meetings held as part of the BLM's planned outreach to facilitate coordination with Native American Tribes, cooperating agencies, and consulting parties. The meetings focused on providing information on the design of action alternatives that would reduce impacts to wildlife, cultural resources, transportation, hunting, wetlands, the connected surface waters and groundwaters, and other resources. The feedback from these meetings was consistent with the information that the BLM had received throughout the National Environmental Policy Act process and is incorporated into the final analysis within the EIS.
- In response to the amendments to the National Environmental Policy Act via the Fiscal Responsibility Act of 2023 (Public Law No. 118-5, Section 321(e)(1)(B), 137 Stat. 10 and 41–42), the BLM revised the organization of the final EIS to comply with the Fiscal Responsibility Act's 300-page limit, i.e., the limit for a proposed agency action determined to be of "extraordinary complexity." Among other things, the resources and issues analyzed in detail in the draft EIS that the BLM concluded were either not significant or could be mitigated to less than significant were moved to EIS Appendix 15.
- The BLM identified a Preferred Alternative based on a combination of elements of Alternatives B, C, D, and E, which the BLM examined in the draft EIS. The Preferred Alternative responds to

resource impact concerns raised by cooperating agencies and the public based on feedback received on the draft EIS.

- The applicant revised the Proposed Action with updated estimates for water needs, provided a more detailed Grazing Coordination Plan, and added information to their blasting and reclamation plans.
- The BLM updated the greater sage-grouse analyses to include population connectivity and broader population trends.
- The BLM examined additional issue statements to ensure the analysis of potential impacts included discussions on existing groundwater wells, groundwater quality, Minidoka National Historic Site interpretive purpose, regional airports, aerial agricultural operations, and potential areas of critical environmental concern.
- The BLM refined avoidance and minimization measures and plans for compensatory mitigation.

The final EIS and all project documents are available on the project website at: https://eplanning.blm.gov/eplanning-ui/project/2013782/510. Thank you for your continued interest in the Lava Ridge Wind Project.

Sincerely,

Codie Martin, Field Manager

EXECUTIVE SUMMARY

Introduction

Magic Valley Energy, LLC (MVE), has applied for a right-of-way (ROW) grant to construct, operate and maintain, and decommission the Lava Ridge Wind Project (the project), a wind energy facility and ancillary facilities primarily on Bureau of Land Management (BLM) public lands in Jerome, Lincoln, and Minidoka Counties, Idaho (Figure ES-1). The project would be located approximately 25 miles northeast of Twin Falls, Idaho, in the area managed by the BLM Shoshone Field Office (SFO). The project would consist of up to 400 wind turbines and associated infrastructure and a 500-kilovolt (kV) generation intertie transmission line that would interconnect at Idaho Power's existing Midpoint Substation or at a new substation along the permitted Southwest Intertie Project (SWIP) northern portion (SWIP-North) 500-kV transmission line. MVE submitted their application and a preliminary plan of development (POD) in February 2020. Through coordination with the BLM and cooperating agencies, MVE revised their POD and resubmitted it to the BLM in December 2023 (MVE 2023) (EIS Appendix 1).[1]

The project's environmental impact statement (EIS), prepared under the National Environmental Policy Act of 1969 (NEPA; 42 United States Code [USC] Section 4321, et seq.), analyzes and discloses the potential environmental impacts of MVE's proposed project and alternatives for BLM decision making. The Fiscal Responsibility Act of 2023 (Public Law No. 118-5, Section 321(e)(1)(B), 137 Stat. 10 and 41–42) amended NEPA by requiring that EISs not exceed 150 pages, excluding citations or appendices, except for proposed agency actions of "extraordinary complexity" (42 USC 4336a(e)(1)(A)-(B)). Although this new statutory requirement was enacted after the public comment period for the draft EIS closed, the amendments did not offer any exceptions or waivers to the mandatory page limits. Consequently, the BLM has determined that the size, scope, and scale of the proposed agency action is of "extraordinary complexity" and has reorganized the final EIS to meet the 300-page limit mandated by the statute. In doing so, the BLM focused the final EIS on resources and issues that would be significantly affected by the preferred alternative pursuant to 40 Code of Federal Regulations 1502.1. Among other things, the resources and issues that were analyzed in detail in the draft EIS, which the BLM concluded were either not significant or could be mitigated to less than significant, were moved to EIS Appendix 15.

The BLM is the lead agency for the EIS. Seven government entities are participating as cooperating agencies: National Park Service, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, State of Idaho, Jerome County, Lincoln County, and Minidoka County.

Purpose and Need

The BLM's purpose is to respond to MVE's application for a ROW grant to construct, operate and maintain, and decommission a wind energy facility on public lands in compliance with the Federal Land Policy and Management Act (FLPMA), BLM ROW regulations, and other applicable federal laws and policies (detailed in EIS Appendix 2). The need for this action arises from FLPMA, which requires the BLM to manage public lands for multiple use and sustained yield and authorizes the BLM to issue ROW grants on public lands for systems for generation, transmission, and distribution of electric energy (FLPMA Title V). The BLM will review the Proposed Action and other alternatives and decide whether to approve, approve with modifications, or deny MVE's application, and may include any terms, conditions, and stipulations it determines to be in the public interest.

[1] The entirety of the POD and all its appendices are provided as Appendix 1 of this EIS. The POD is referred to as MVE (2023) throughout the EIS.

Decision to be Made

The EIS provides the information and environmental analysis necessary to inform the BLM's Authorized Officer and the public about the potential environmental impacts from the project.

The BLM decision to be made will include

- whether to grant, grant with modification, or deny a ROW to construct, operate and maintain, and decommission the proposed wind energy facility on public lands;
- the most appropriate location for the project on public lands (if a ROW is granted); and
- the terms and conditions (stipulations) for the construction, operation and maintenance, and decommissioning of the wind energy facility on public lands that should be applied to the ROW, if granted.

Proposed Action and Alternatives

Internal and external scoping identified issues to be analyzed in the EIS, and a range of alternatives was developed to address those issues. The BLM developed a reasonable range of alternatives, and alternatives were carried forward for detailed analysis if they 1) met the BLM's purpose and need, 2) were technically and economically feasible, 3) addressed the substantive issues identified in scoping, 4) reduced potential adverse environmental effects or addressed resource conflicts when compared to the Proposed Action, and 5) were consistent with management objectives outlined in BLM (1986), as amended. Alternatives were developed using subsets of the Proposed Action siting corridors.

This final EIS evaluates the No Action, Proposed Action (Alternative B), and four additional action alternatives (Figure ES-2). Project elements common to all action alternatives are described below, and a summary of project components by action alternative is provided in Table ES-1. See EIS Tables 2.4-1 through 2.4-3 for detailed comparisons of the project components for Alternatives B, C, D, and E and the Preferred Alternative.

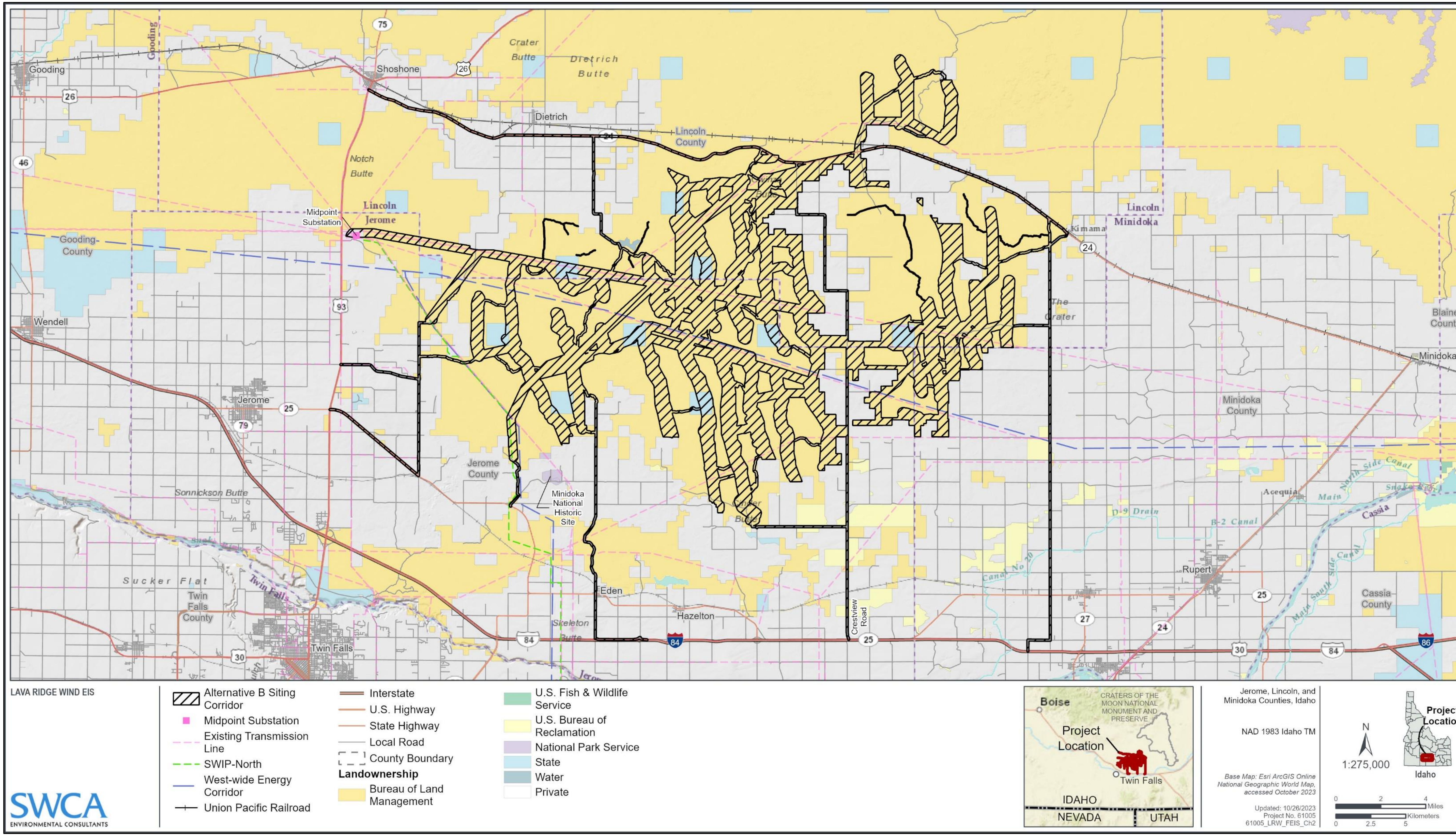

Figure ES-1. Alternative B (Proposed Action) siting corridors.

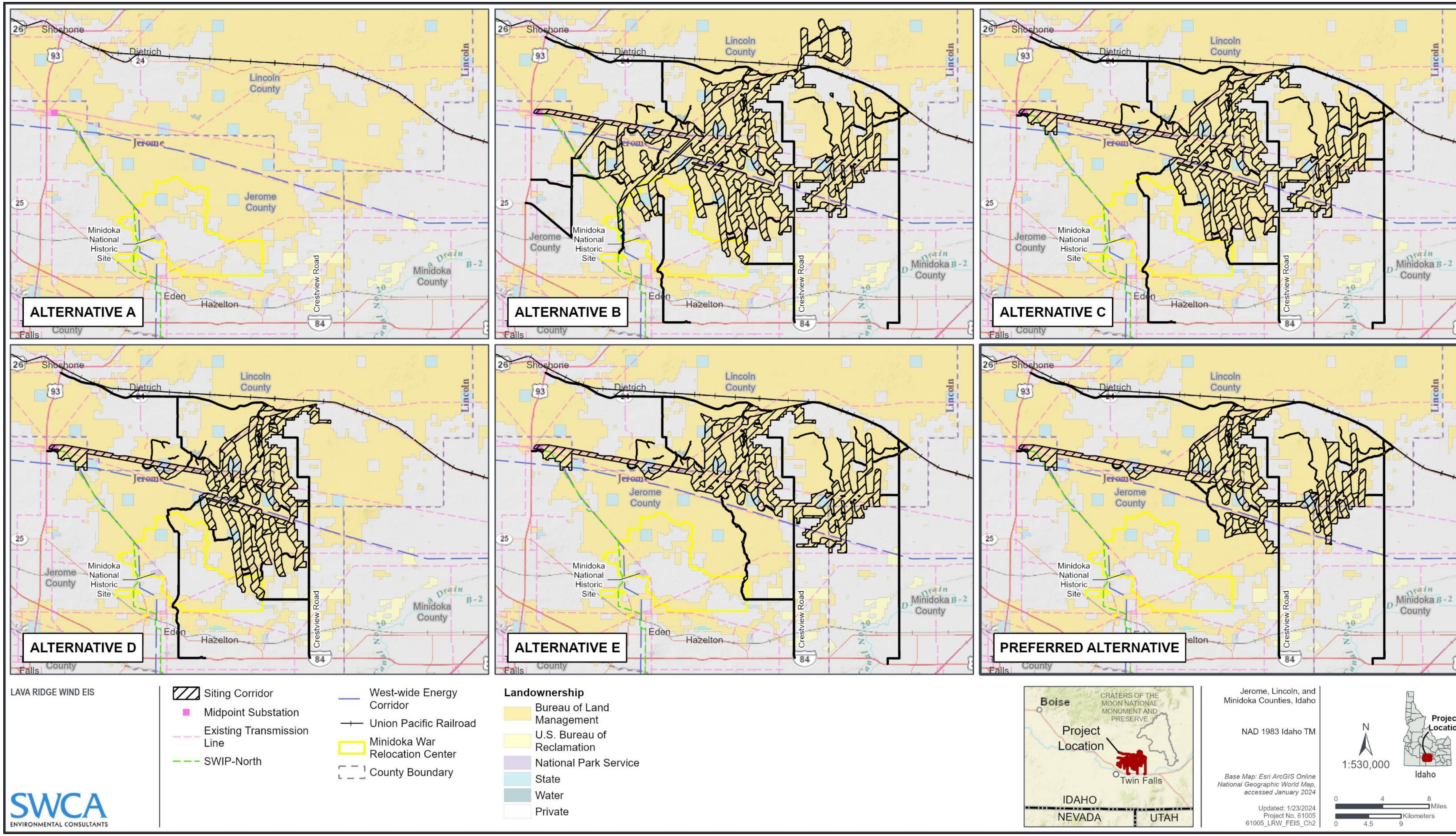

Figure ES-2. Action alternatives comparison.

Alternative A (No Action)

Under Alternative A, the BLM would deny MVE's application for construction, operation and maintenance, and decommissioning of the project. The project facilities would not be built, and existing land uses and present activities in the area would continue.

Project Elements Common to All Action Alternatives

Regardless of the action alternative selected, specific project requirements, constraints, and elements apply to all action alternatives analyzed in detail. These include the project location, construction methods, project components, operation and maintenance activities, and decommissioning activities. Project requirements, constraints, and elements common to all action alternatives are detailed in EIS Appendix 11 and summarized here.

SITING CORRIDORS

All action alternatives would site infrastructure in corridors approximately 0.5 mile wide. The three types of corridors are turbine siting corridors, ancillary siting corridors, and range improvement corridors. The siting corridors, regardless of corridor type, would have work area or infrastructure disturbance (see EIS Section 2.3.2 [Work Area and Infrastructure Disturbance]). Although the exact location of infrastructure and activities within the siting corridors is unknown at this time, evaluating the entirety of the siting corridors for potential impacts provides flexibility to site the project components where necessary (from both resources and engineering perspectives) within the siting corridors. The project's final design and engineering would be completed after the BLM has issued a record of decision (ROD) and would be informed by applicant-committed measures and other mitigation requirements established in the ROD.

Within the siting corridors, work area disturbance refers to the land needed to construct, and subsequently decommission, the project. Work areas would have interim reclamation after construction and may not be wholly disturbed during project operation. Infrastructure disturbance refers to the land occupied by infrastructure that would remain disturbed from the beginning of construction through decommissioning of the wind energy facility. These areas are detailed in EIS Section 2.3.2 (Work Area and Infrastructure Disturbance).

PROJECT COMPONENTS

Wind turbines and pads: A wind turbine typically consists of three main components: the nacelle, the tower, and rotor blades. MVE (2023) describes turbine hub heights ranging from 260 to 460 feet above the ground, depending on the turbine model and size selected. The turbine rotor blades would extend between 130 and 280 feet from the hub, meaning a rotor diameter between 260 and 560 feet and a rotor swept area between 53,100 and 246,400 square feet. When a blade is in line with the turbine tower, the maximum height would be between 390 and 740 feet.[2]

Access roads: Project access would be provided by existing roads (many of which would require improvements) and new roads. Project roads would be maintained as needed and would generally remain open to the public. During certain construction and operation and maintenance activities, public access may be restricted to ensure public safety.

[2] MVE (2023) provides size characteristics for the potential use of 2-MW to 6-MW turbines. The Chapter 3 impacts analyses in the EIS and in EIS Appendix 15 evaluate the potential use of 3-MW to 6-MW turbines.

Underground and overhead 34.5-kV collection system: Each wind turbine would be connected to a system of overhead or underground electrical collector lines. Lines would be buried where feasible; however, because of the presence of bedrock throughout the area, some overhead lines would be required

Substations: The project would include up to five collector substations, one 230/500-kV substation, and one interconnection substation. Substations are used to combine electricity from the individual turbines and then increase the voltage so the electricity can be transported to the electrical grid. Construction of these substations could include site clearing, grading, excavations, blasting, and use of concrete.

Transmission lines: A series of 230-kV overhead transmission lines would connect the collector substations to one larger substation where the voltage would be increased to 500 kV (see Figure App11-1 in EIS Appendix 11). An overhead 500-kV transmission line would connect the 230/500-kV substation to the project's point of interconnection at the Midpoint Substation or an alternative location along the SWIP-North alignment.

Battery energy storage system: A battery energy storage system would be located adjacent to an on-site project substation. Though the capacity of the battery energy storage system would be determined in the final design phase, once a specific turbine type is selected and commercial contracts for power are finalized, it would support thousands of megawatt-hours of storage potential.

Operation and maintenance facilities: The project would have up to three operation and maintenance facility locations. The operation and maintenance buildings would include offices, a conference room, a break room, restrooms, a control room (where staff would monitor and control operation of the facility), and maintenance shops and warehouses (where staff can bring equipment for testing, repairs, or maintenance).

Meteorological towers: In addition to the eight meteorological (met) towers currently on site, up to 12 calibration met towers and up to 12 power performance test met towers would be installed during the construction phase. Of the 12 performance test met towers installed, up to five would remain as permanent met towers throughout project operation.

Project lighting: The turbines would be marked or lighted per Federal Aviation Administration (FAA) guidelines and an approved lighting plan to adequately warn aircraft pilots of the obstructions at night. If approved by the FAA, MVE would deploy an aircraft detection lighting system to mitigate the need for continuous operation of the flashing red lights during nighttime hours. An aircraft detection lighting system has one or more elevated radars that scan the region near the project for aircraft and activate the red flashing lights on turbines only when an aircraft is detected within a specified distance.

Reclamation: The goal of reclamation would be to return the site to similar conditions as the undisturbed surrounding areas, as much as is feasible. Disturbed areas would be reclaimed following MVE's Reclamation Plan (Appendix E of MVE [2023]). MVE would be required to have a reclamation bond and would be held to BLM-approved reclamation success criteria.

PROJECT PHASES AND DURATION

Construction and decommissioning for all action alternatives may occur continuously or with gaps of time in between, in which case construction and decommissioning could take longer than 2 to 3 years.

The EIS uses the term *life of the project* when referring to the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for Alternatives C–E and the Preferred Alternative.

The EIS assumes that interim reclamation following construction would result in successful revegetation of native grasses in 2 to 5 years after which the BLM would evaluate and would implement further reclamation activities if needed.

EIS Appendix 4 details applicant-committed measures and BLM mitigation measures that include project timing stipulations. Final reclamation would occur concurrent with decommissioning and is described in the Final Reclamation section of EIS Appendix 11.

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Table ES-1. Executive Summary of Project Components by Action Alternative

Project Component	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
General project area	197,474 acres	146,389 acres	110,315 acres	122,444 acres	103,864 acres
Siting corridors	84,051 acres	65,215 acres	48,597 acres	50,680 acres	44,768 acres
Wind turbines	Up to 400 3-MW turbines or up to 349 6-MW turbines	Up to 378 3-MW turbines or up to 259 6-MW turbines	Up to 280 3-MW turbines or up to 179 6-MW turbines	Up to 269 3-MW turbines or up to 194 6-MW turbines	Up to 241 3-MW or 5-MW turbines
Estimated generation capacity*	1,200–2,094 MW	1,134–1,554 MW	840–1,074 MW	807–1,164 MW	723–1,205 MW
Estimated annual generation in terawatt hours (TWh) for the project operating at 35%–45% net capacity factor§	3.7–4.7 TWh with all 3-MW turbines 6.4–8.3 TWh with all 6-MW turbines	3.5–4.5 TWh with all 3-MW turbines (5% reduction from Alternative B) 4.8–6.1 TWh with all 6-MW turbines (26% reduction from Alternative B)	2.6–3.3 TWh with all 3-MW turbines (30% reduction from Alternative B) 3.3–4.2 TWh with all 6-MW turbines (49% reduction from Alternative B)	2.5–3.2 TWh with all 3-MW turbines (33% reduction from Alternative B) 3.6–4.6 TWh with all 6-MW turbines (44% reduction from Alternative B)	2.2–2.9 TWh with all 3-MW turbines (38% reduction from Alternative B) 3.7–4.8 TWh with all 5-MW turbines (42% reduction from Alternative B)
Ground disturbance	9,114 acres total: 2,374 acres infrastructure 6,740 acres work areas	6,953 acres total: 1,811 acres infrastructure 5,142 acres work areas	4,838 acres total: 1,124 acres infrastructure 3,714 acres work areas	5,136 acres total: 1,402 acres infrastructure 3,734 acres work areas	4,492 acres total 992 acres infrastructure 3,500 acres work areas
Total project access roads (see also EIS Table 2.4-2)	486 miles new 147 miles improved	360 miles new 117 miles improved	270 miles new 83 miles improved	272 miles new 101 miles improved	231 miles new 79 miles improved
Construction crane path	33 miles new 14 miles improved	26 miles new 10 miles improved	23 miles new 7 miles improved	19 miles new 5 miles improved	14 miles new 5 miles improved
Vehicle traffic† (see also EIS Table 2.4-3)	2,427,698 trips total: 812,882 trips construction 901,740 trips operation 713,076 trips decommissioning	2,359,276 trips total: 789,281 trips construction 868,043 trips operation 701,952 trips decommissioning	1,836,305 trips total: 636,222 trips construction 630,704 trips operation 569,379 trips decommissioning	1,777,055 trips total: 616,413 trips construction 608,269 trips operation 552,373 trips decommissioning	1,824,039 trips total 770,247 trips construction 545,868 trips operation 507,924 trips decommissioning
Fixed-wing aircraft traffic	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation
Helicopter traffic‡	390 days total 240 days (8 hours/day) construction 150 days (40 hours/year) operation	390 days total 240 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation
Blasting	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction
Water use	191,750,000 gallons total: 160,000,000 gallons construction 13,300,000gallons operation and maintenance 18,450,000 gallons decommissioning	262,310,000 gallons total: 230,000,000 gallons construction 12,810,000 gallons operation and maintenance 19,500,000 gallons decommissioning	198,280,000 gallons total: 175,000,000 gallons construction 9,280,000 gallons operation and maintenance 14,000,000 gallons decommissioning	192,450,000 gallons total 170,000,000 gallons construction 8,950,000 gallons operation and maintenance 13,500,000 gallons decommissioning	172,500,000 gallons total: 150,000,000 gallons construction 9,000,000 gallons operation and maintenance 13,500,000 gallons decommissioning
Groundwater wells	6 construction; 4 remain open during operation and decommissioning	5 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning
Livestock fencing (20%–25% of the temporary fencing may be deployed at any given time) (2 years construction, 2 years decommissioning)	395 miles temporary	303 miles temporary	222 miles temporary	257 miles temporary	200 miles temporary
Range improvements	Up to 65 new troughs Up to 54 new waterline miles	Up to 55 new troughs Up to 54 new waterline miles	Up to 40 new troughs Up to 27 new waterline miles	Up to 40 new troughs Up to 42 new waterline miles	Up to 40 new troughs Up to 42 new waterline miles
Personnel	400–850 construction and decommissioning 20–75 operation and maintenance	400–850 construction and decommissioning 20–75 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance
Collector substations	5 substations	5 substations	5 substations	4 substations	4 substations
230/500-kV substation	1 substation	1 substation	1 substation	1 substation	1 substation
Interconnection substation	1 substation	1 substation	1 substation	1 substation	1 substation

Project Component	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
34.5-kV underground and overhead collector lines	248 miles total: 56 miles underground 192 miles overhead Estimated 3,455 poles	201 miles total: 53 miles underground 148 miles overhead Estimated 2,664 poles	150 miles total: 39 miles underground 111 miles overhead Estimated 1,998 poles	145 miles total: 38 miles underground 107 miles overhead Estimated 1,926 poles	156 miles total: 34 miles underground 122 miles overhead Estimated 2,196 poles
230-kV transmission line	34 miles Estimated 306 support structures	34 miles Estimated 306 support structures	21 miles Estimated 189 support structures	25 miles Estimated 225 support structures	24 miles Estimated 218 support structures
500-kV transmission line	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures
Battery energy storage system	1 system	1 system	1 system	1 system	1 system
Operation and maintenance facilities	3 facilities	3 facilities	3 facilities	3 facilities	3 facilities
Laydown and staging yards	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation
Concrete batch plants	3 batch plants	3 batch plants	3 batch plants	3 batch plants	3 batch plants
Meteorological (met) towers	5 permanent towers (260–460 feet tall) 19 temporary towers (up to 460 feet tall, 2–3 years)	5 permanent towers (260–460 feet tall) 19 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)
Aircraft detection lighting system towers	4 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)
New impervious surface (for substations and buildings)	13.5 acres	13 acres	10 acres	9.5 acres	9.5 acres
Intermodal yards	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka

Note: See EIS Section 2.3.2 (Work Area and Infrastructure Disturbance) for definitions of work area and infrastructure disturbance. See EIS Tables 2.4-1 through 2.4-3 for a detailed comparison of the project components by action alternative.

* The minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 6-MW turbines.

§ TWh are megawatt hours multiplied by 1 million or gigawatt-hours multiplied by 1,000. Annual net capacity factor is the ratio of the net electricity generated in 1 year to the energy that could have been generated at continuous full-power operation in 1 year.

† All trips one way, as reported in Appendix J of MVE (2023). Using one-way trips helps simplify the analysis and provides a more accurate result. For all action alternatives, operational trips are estimated for a 30-year operation phase and decommissioning trips are estimated for a 2-year phase. Construction trips are estimated for a 2-year phase for Alternatives B through E, and a 3-year phase for the Preferred Alternative.

‡ No helicopter use would occur during decommissioning.

Alternative B (Proposed Action)

Under Alternative B, the BLM would authorize (with terms and conditions) the wind energy facility and siting corridors as proposed by MVE (see Table ES-1 and Figures ES-1 and ES-2). Alternative B could have up to 400 3-megawatt (MW) turbines or up to 349 6-MW turbines, or a combination of 3-MW and 6-MW turbines not to exceed 400.

Alternative B would have 2 years of construction, up to 30 years of operation and maintenance, and 2 years of decommissioning. The life of the project would be 34 years for Alternative B.

See Table ES-1 for details.

Alternative C (Reduced Western Corridors)

Alternative C would reduce the project's overall extent by eliminating development within specific corridors (see Table ES-1 and Figure ES-2). The intent of this alternative is to avoid and minimize potential impacts to Wilson Butte Cave, Minidoka National Historic Site (NHS), and the communities that have connections to these places. Alternative C would also aim to encourage development in areas that have already been impacted by energy infrastructure and reduce the extent of wildlife habitat fragmentation.

Under Alternative C, the southwest and northeast siting corridors (proposed within the Proposed Action) would not be considered for wind turbine siting, but some of these corridors would still allow access or powerline development. Alternative C would also limit the project's 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. Alternative C would not include siting corridors nearest to and in the most prominent viewing directions of Wilson Butte Cave and Minidoka NHS to minimize and avoid impacts to the setting and feeling of these places while still maintaining connectivity of turbine corridors to the main substation and maintaining electricity generation.

Alternative C would not include siting corridors north of Idaho Highway 24 (ID 24) to minimize the extent of wildlife habitat fragmentation and reduce considerable development in areas that are relatively undeveloped and have a low potential to be successfully reclaimed. Alternative C would not include siting corridors northwest of the existing Idaho Power 345-kV Kinport to Midpoint transmission line to provide for a path with fewer obstructions to the western end of the project for pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) migration.

Alternative C would have 3 years of construction, up to 30 years of operation and maintenance phase, and 3 years of construction and decommissioning. The life of the project would be at least 36 years for Alternative C.

See Table ES-1 for details.

Alternative D (Centralized Corridors)

Alternative D would eliminate nearly the same siting corridors that are eliminated under Alternative C and additionally would not include most of the siting corridors east of Crestview Road to avoid development in areas that have higher sagebrush cover and protect functional greater sage-grouse (*Centrocercus urophasianus*) habitat (see Table ES-1 and Figure ES-2). The reduced overall project footprint would also avoid or minimize impacts to other resources and areas of concern. As a result of this additional avoidance, the total acres in the siting corridors under Alternative D would be the smallest of the action alternatives. Therefore, the analysis of Alternative D provides insight on how a reduced development scenario would result in potential trade-offs within a different development area.

Alternative D would have 3 years of construction, up to 30 years of operation and maintenance phase, and 3 years of construction and decommissioning. The life of the project would be at least 36 years for Alternative D.

See Table ES-1 for details.

Alternative E (Reduced Southern Corridors)

The intent of Alternative E is to avoid and minimize potential impacts to Minidoka NHS and Japanese American communities associated with the site. Alternative E builds off of Alternative C but would further avoid and minimize potential impacts to the setting and feeling of Minidoka NHS by removing additional siting corridors from development (see Table ES-1 and Figure ES-2). Removing additional siting corridors would also reduce potential impacts to the ability of descendant communities and the general public to experience Minidoka NHS.

Alternative E would eliminate the same siting corridors that are eliminated under Alternative C and would continue to limit the project’s 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. Alternative E would also eliminate most of the siting corridors west of Crestview Road and south of the existing West-wide Energy Corridor.

These siting corridor eliminations are intended to further reduce visibility of the project from Minidoka NHS. Viewshed mapping and visual simulations from Minidoka NHS (SWCA Environmental Consultants 2024) were used to identify the turbine corridors that had the potential to introduce a strong or moderate degree of visual contrast.

Alternative E proposes the same adjustments to siting corridors located north of ID 24 that are made in Alternative C. However, portions of some corridors are included in Alternative E that are not included in Alternative C. This corridor configuration is intended to provide an assessment of the potential impacts resulting from these specific corridors in combination with a smaller project footprint and minimization measures.

Alternative E would have 3 years of construction, up to 30 years of operation and maintenance phase, and 3 years of construction and decommissioning. The life of the project would be at least 36 years for Alternative E.

See Table ES-1 for details.

Preferred Alternative

The BLM has identified a Preferred Alternative based on a combination of elements of Alternatives B, C, D, and E. The Preferred Alternative responds to resource impact concerns raised by cooperating agencies and the public through the public comments received on the draft EIS. The Preferred Alternative would reduce visual impacts to Minidoka NHS, reduce disturbance to big game migration routes and winter concentration areas, reduce impacts to Jerome County Airport and agricultural aviation uses, and reduce impacts to non-participating private landowners.

To reduce visibility of the project from Minidoka NHS, the Preferred Alternative would increase the distance of turbine corridors from Minidoka NHS as compared to Alternatives C and D. All but one turbine corridor would be located outside of the immediate foreground and foreground of Minidoka NHS.

The one turbine corridor retained within the foreground would be located approximately 9.5 miles from the Minidoka NHS Visitor Center and would be obstructed by existing infrastructure on adjacent farmland. The Preferred Alternative would include a maximum turbine tip height limit of 660 feet and would have the fewest turbines visible from and within the foreground of Minidoka NHS.

The siting corridor exclusions and maximum turbine tip height would increase turbine siting corridor distance from the Jerome County Airport and facilitate more options for flight paths to agriculture lands in the central portion of the project.

To minimize development within big game migration routes and winter concentration areas, the Preferred Alternative would exclude siting corridors south of ID 24 and north of Idaho Power Company line 805, exclude siting corridors directly north of the Milner-Gooding Canal, and exclude corridors east of Crestview Road and west of Kimama Butte. Under this alternative, access roads that would enter the project from the north near Star Lake and from the south near Cinder Butte would be removed, and locations for operational and maintenance buildings would be limited to areas near existing county roads or highways.

To minimize impacts to non-participating private landowners, the Preferred Alternative would include a setback distance of 1.5 times the maximum turbine tip height, or 1,000 feet (whichever is greater), from the property line of non-participating private landowners and 5 times the total turbine height from existing residences. When the setbacks are applied to a maximum turbine height of 660 feet, the setback from the property line would be 1,000 feet (0.19 mile), and the setback from residences would be 3,300 feet (0.63 mile).

The Preferred Alternative would have 3 years of construction, up to 30 years of operation and maintenance, and 3 years of construction and decommissioning. The Preferred Alternative would be constructed in subphases that would concentrate activities in a single area at a time, require adherence to seasonal wildlife restrictions and measures aimed to reduce impacts to wildlife during crucial time periods (see EIS Appendix 4 for applicant-committed measures and BLM mitigation measures), and provide the necessary timing elements for the BLM and grazing permittees to plan and coordinate grazing operations prior to and throughout the construction of the project.

Construction would be divided into three subphase areas: North Star Lake, South Star Lake, and Sid Butte (see EIS Figure 2.4-4). Although MVE would develop a final construction schedule in coordination with the BLM and grazing permittees prior to construction, it is anticipated that construction year 1 would occur in the North Star Lake subphase area, construction year 2 would occur in the Sid Butte subphase area, and construction year 3 would occur in the South Star Lake subphase area. The life of the project would be at least 36 years for the Preferred Alternative.

See Table ES-1 for the Preferred Alternative project components and a detailed comparison of these components to those of Alternatives B, C, D, and E.

Environmental Impacts

Table ES-2 summarizes and compares the impacts of the action alternatives on the resources and issues analyzed in the EIS or EIS Appendix 15. The analysis approach is described in detail in EIS Section 3.1. Each Affected Environment section within EIS Chapter 3 describes baseline conditions that would remain under Alternative A (No Action).

Mitigation: The project would be subject to applicant-committed measures, mitigation required by BLM policy, and additional project-specific mitigation as described in EIS Section 2.3.4 (Avoidance and

Minimization) and EIS Appendix 4 (Mitigation). The EIS impact analyses assume the project would include implementation of these measures and discloses remaining impacts. After considering the potential impacts, considering the public comments, and evaluating additional minimization measures, the BLM would determine if compensatory mitigation is warranted. Compensatory mitigation could be applied to offset residual impacts that inhibit achieving compliance with laws and policies or that impact important, scarce, or sensitive resources. The final EIS describes the residual impacts warranting compensatory mitigation (see EIS Chapter 3); compensatory mitigation frameworks for particular resources are included in EIS Appendix 4. The EIS summarizes the applicant-committed measures in Tables App4-2a through App 4-2o (in EIS Appendix 4) that are also detailed with more context in MVE (2023). The applicant-committed measures and other protection measures required by BLM policy (Table App4-3 in Appendix 4) are part of Alternative B and are used to evaluate the impacts described in the main EIS and EIS Appendix 15 and summarized in Table ES-2. After considering the potential impacts resulting from Alternative B, the BLM identified additional measures intended to further avoid and minimize potential impacts; these additional measures are described in Table App4-4 in EIS Appendix 4. Whichever action alternative is selected, these additional measures would be fully incorporated. The EIS describes the potential impacts of Alternative B if these additional measures were applied and describes the potential impacts of Alternatives C, D, E, and the Preferred Alternative with the additional measures fully incorporated. Table ES-2 summarizes the impacts described in the main EIS and in EIS Appendix 15.

VISUAL IMPACT OUTCOMES CROSSWALK

The potential non-physical impacts to cultural resources (at Minidoka NHS), Japanese American and Minidoka-connected environmental justice communities, and the NPS Minidoka NHS interpretive purpose discussed in the EIS (Sections 3.5.5, 3.6.1, and 3.19, respectively), and summarized in Table ES-2, are related; these impacts are caused by the degree of visual change in landscape character (EIS Section 3.16.1) and the addition of noise to the soundscape. However, even though the underlying factors contributing to impacts are the same, the type and intensity of the impacts are unique to the resource being analyzed. Table ES-3 provides a crosswalk of the related potential impacts to the visual and audible landscape and how those impacts would non-physically affect cultural resources, Japanese American and Minidoka-connected environmental justice communities, and the NPS Minidoka NHS interpretive purpose.

Table ES-2. Summary of Project Impacts from the Action Alternatives

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Air quality (EIS Appendix 15)	Minor air pollutant emissions but would not exceed federal or state ambient air quality standards or cause any visibility impairment inside the Class I area or the Class II special considerations area.	Reduced air pollutant emissions due to additional avoidance and minimization measures. Furthermore, construction emissions would be emitted over 3 years for Alternative B with Additional Measures rather than 2 years for Alternative B.	Would be similar to or slightly reduced from Alternative B with Additional Measures. Furthermore, construction emissions would be emitted over 3 years for Alternative C rather than 2 years for Alternative B.	Would be similar to or slightly reduced from Alternative B with Additional Measures. Because Alternative D has the smallest ground-disturbance footprint, it is likely that Alternative D would see a larger reduction in construction emissions than Alternatives B, C, or E.	Would be similar to or slightly reduced from Alternative B with Additional Measures.	Would be slightly reduced from Alternative B, generating fewer emissions annually than the other alternatives.
Bat populations and roosting habitat (main EIS)	Highest estimated bat fatality rate from collisions with turbines: 1,800–3,141 (mean), 8,880–15,496 (maximum) bats per year. May adversely affect populations of some species of migratory tree bats and cave-hibernating bats whose populations are reduced by white nose syndrome. Greatest disturbance to potential bat roosting habitat (due to largest ground-disturbance footprint), though significant bat roosting features are mostly absent from the siting corridors. Applicant-committed measures such as feathering turbine blades at low wind speeds, completing postconstruction monitoring of bat fatality rates, and implementing adaptive management (including curtailment) would reduce bat fatalities but not eliminate them. Compensatory mitigation may be required if adaptive management measures are unsuccessful at reducing bat fatalities.	Additional avoidance and minimization measures would further reduce bat fatalities by allowing more precise quantification of bat fatalities that would lead to a more informed and targeted curtailment strategy. Curtailment could be implemented sooner, if warranted. These measures would help minimize the potential for the project to cause, or contribute to, a trend toward listing under the Endangered Species Act (ESA) for special-status bat species.	Same as Alternative B with Additional Measures except there would be less ground disturbance and less power generation, which would result in fewer impacts to bat roosting habitat and fewer bat fatalities from collisions with turbines: 1,733–2,331 (mean), 8,547–11,500 (maximum) bats per year. The same additional avoidance and minimization measures would be implemented to further reduce bat fatalities as compared to Alternative B.	Same as Alternative C except less ground disturbance would occur near known roost sites and areas of concentrated bat foraging activity (i.e., irrigation canals). Power generation would also be further reduced, and therefore the estimated bat fatality rate would be lower: 1,256–1,611 (mean), 6,194–7,948 (maximum) bats per year. The same additional avoidance and minimization measures would be implemented to further reduce bat fatalities as compared to Alternative B.	Same as Alternative C except less ground disturbance would occur near known areas of concentrated bat foraging activity (i.e., irrigation canals). This alternative could also lead to the least power generation and therefore the lowest estimated bat fatality rate: 1,210–1,746 (mean), 5,972–8,614 (maximum) bats per year. The same additional avoidance and minimization measures would be implemented to further reduce bat fatalities as compared to Alternative B.	Same as Alternative C except less ground disturbance would occur near known roost sites and areas of concentrated bat foraging activity (i.e., irrigation canals). Power generation would also be further reduced and therefore the estimated bat fatality rate would be lower: 1,085–1,808 (mean), 5,350–8,917 (maximum) bats per year. The same additional avoidance and minimization measures would be implemented to further reduce bat fatalities as compared to Alternative B.
Avian populations (main EIS)	Highest estimated avian fatality rate from collisions with turbines: 3,240–5,654 (mean), 10,200–17,799 (maximum) birds per year. Most avian species are unlikely to experience substantial effects, but the populations of some special-status species (e.g., ferruginous hawk [*Buteo regalis*], long-billed curlew [*Numenius americanus*], short-eared owl [*Asio flammeus*], and burrowing owl [*Athene cunicularia*]) could be adversely impacted. Alternative B also includes the most met towers and therefore has the highest avian fatality rate from met tower collisions, though met tower fatalities would be small in comparison to turbine fatalities. Postconstruction monitoring would be implemented to assess the actual avian fatality rate and determine whether curtailment or other adaptive management measures need to be implemented to reduce avian fatalities. Compensatory mitigation may be required if adaptive management measures are unsuccessful at reducing avian fatalities.	Same as Alternative B except additional preconstruction surveys would be implemented to better assess owl use in the siting corridors. Additional postconstruction monitoring requirements would be implemented to better assess avian fatality rates and identify opportunities to minimize or avoid effects to species of concern (e.g., ferruginous hawk). Curtailment could be implemented sooner, if warranted. These additional measures would minimize the potential for the project to cause, or contribute to, a trend toward federal listing for special-status avian species.	Same as Alternative B with Additional Measures except generation capacity would be reduced, and therefore fewer avian fatalities from collisions with turbines would be expected: 3,062–4,196 (mean), 9,639–13,209 (maximum) birds per year.	Same as Alternative C except generation capacity would be further reduced, and therefore fewer avian fatalities from collisions with turbines would be expected: 2,268–2,900 (mean), 7,140–9,129 (maximum) birds per year. This alternative would include seven fewer met towers, and therefore fewer avian fatalities from met tower collisions would be expected.	Same as Alternative C though generation capacity would be similar to Alternative D. The estimated avian fatality rates are 2,179–3,143 (mean) and 6,860–9,894 (maximum) birds per year. The number of met towers would be the same as Alternative D. Therefore, avian fatalities from met tower collisions would be the same as Alternative D.	Same as Alternative C though generation capacity would be similar to Alternative E. The estimated avian fatality rates are: 1,952–3,254 (mean), 6,146–10,243 (maximum) birds per year. The number of met towers would be the same as Alternative D. Therefore, avian fatalities from met tower collisions would be the same as Alternative D.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Eagles (main EIS)	Highest estimated eagle fatalities from turbine collisions: 13.31 golden eagles per year and 0.56 bald eagles per year. Greatest disturbance to habitat for eagle prey species and therefore greatest impacts on eagle foraging success. Applicant-committed measures such as avoiding known eagle nests, completing postconstruction monitoring of actual eagle fatality rates, and implementing adaptive management (including curtailment) would reduce eagle fatalities but not eliminate them. Compensatory mitigation stipulated by the project's eagle incidental take permit, if approved, would offset unavoidable fatalities. With the implementation of these measures, impacts to individual eagles would be unlikely to cause, or contribute to, a trend toward federal listing.	Same as Alternative B except additional limitations on construction activities during the eagle breeding season to further minimize potential impacts to eagles and to reduce the likelihood of eagle fatalities.	Same as Alternative B with Additional Measures except less power generation, fewer overhead collector lines, and fewer new and improved access roads would result in fewer estimated eagle fatalities from turbine collisions: 11.26 golden eagles per year and 0.11 bald eagle per year. Disturbance to habitat for eagle prey species would also be reduced.	Same as Alternative C except second-lowest power generation and new and improved access roads and the second-fewest overhead collector lines would result in the second-lowest estimated eagle fatalities from turbine collisions: 7.86 golden eagles per year and 0.11 bald eagles per year. Disturbance to habitat for eagle prey species would also be the least.	Same as Alternative C except less power generation, fewer improved access roads, and the fewest overhead collector lines would result in the lowest estimated eagle fatalities from turbine collisions: 7.66 golden eagles per year and 0.11 bald eagle per year. Disturbance to habitat for eagle prey species would also be the second least.	Same as Alternative C except less power generation, fewer overhead collector lines, and fewer new and improved access roads would result in fewer estimated eagle fatalities from turbine collisions: 4.49 golden eagles per year and 0.11 bald eagle per year. Disturbance to habitat for eagle prey species would also be reduced.
Greater sage-grouse (main EIS)	Would add ground disturbance, roads, fences, overhead lines, turbines, water troughs, human activity, and traffic to the siting corridors, which are in General Habitat Management Areas (HMAs). Use of leks 4L152, 4L159, and 4L160 is likely to decline, and there is an increased risk these leks will be lost, particularly for lek 4L160. Would reduce habitat connectivity between lek 4L160 and leks 4L152 and 4L159 to the northwest, and between lek 4L160 and all seasonal use habitats as it would be surrounded by infrastructure. May disconnect leks 4L152 and 4L159 from the nesting and brood-rearing habitat closest to these leks to the northeast of the project. Would reduce connectivity with Idaho leks/populations to the south and northeast that serve as hubs for local and range-wide genetic connectivity. There is a risk of decline for the population in the analysis area. Largest area of permanent functional habitat loss (786.2 acres). Requires the highest amount of new infrastructure (number of turbines, miles of new roads, miles of new transmission lines) in General HMAs compared to all other action alternatives. All habitat impacts would be offset by required compensatory mitigation that would result in a net conservation gain. Therefore, the project would not result in a trend toward listing under the ESA or a loss of population viability.	Same as Alternative B except with increased likelihood of avoidance and minimization of impacts to sage-grouse.	Same as Alternative B with Additional Measures but would reduce impacts on use and possible loss of leks 4L152, 4L159, and 4L160 due to seasonal restrictions for all phases of the project and would reduce the risk of population decline in the analysis area. Compared to Alternative B would reduce the risk of disconnecting leks 4L152 and 4L159 north of the highway from nesting and brood-rearing habitat to the northeast of the project and would reduce the risk of disconnecting other known leks and seasonal habitat in the north part of the analysis area (in Priority HMA and Important HMA) because this alternative avoids placing project infrastructure nearest sage-grouse leks 4L152 and 4L159. Would reduce impacts on connectivity with Idaho leks/populations to the south and northeast that serve as hubs for local and range-wide genetic connectivity. Less permanent functional habitat loss than Alternative B (535.9 acres). Requires less new infrastructure in General HMAs than Alternative B but more new infrastructure in General HMAs than all other action alternatives.	Same as Alternative C but would not have siting corridors or other disturbance east of Crestview Road. Fewest impacts on sage-grouse than all other action alternatives and, in particular, leks 4L152, 4L159, and 4L160. Impacts would be similar to Alternative C with additional avoidance of development in areas that have higher sagebrush cover and provide functional sage-grouse habitat. This alternative also avoids placing project infrastructure near sage-grouse leks 4L152, 4L159, and 4L160. Would greatly decrease the risk of declining use and loss of lek 4L160 compared to all other action alternatives and decrease the risk of population declines in the analysis area. Connectivity with Idaho leks/populations to the south and northeast that serve as hubs for local and range-wide genetic connectivity would be affected to a lesser extent than all other action alternatives. Smallest area of permanent functional habitat loss of the action alternatives (74.1 acres). Requires less new infrastructure in General HMAs than Alternative B and Alternative C but more new infrastructure in General HMAs than Alternative E and the Preferred Alternative.	Same as Alternative C but would have fewer siting corridors and related infrastructure and human disturbance compared to Alternative C, but infrastructure would be sited in areas with better late-brood-rearing suitability and higher breeding bird densities, which would be more impactful on sage-grouse than placing infrastructure in the western siting corridors. Would pose the same risk of declining use and loss of leks 4L152, 4L159, and 4L160, and of population decline, as Alternative C. Connectivity issues would be the same as Alternative C. Would have the second-largest area of permanent functional habitat loss next to Alternative B (542.4 acres). Requires the lowest amount of new infrastructure in General HMAs compared to all other action alternatives except for the Preferred Alternative.	Same as Alternative E but slightly reduced siting corridors to the north, a few more siting corridors to the south, and less functional acres lost. Would disturb less acres in areas with higher sagebrush cover than all other action alternatives except Alternative D. More acres of general HMA would be disturbed than Alternatives C, D, and E. Would pose the same risk of declining use and loss of leks 4L152, 4L159, and 4L160 as Alternatives C and E. Connectivity issues would be the same as Alternatives C and E, even with the slight reduction in infrastructure around lek 4L160. Second-smallest area of permanent functional habitat loss, with more acres lost than Alternative D and less than all other action alternatives (524.4 acres). Requires the lowest amount of new infrastructure in General HMAs compared to all other action alternatives.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Climate and greenhouse gas (GHG) emissions (EIS Appendix 15)	Minor GHG emissions over the life of the project, but volumes would not be large enough to significantly impact climate change or climate trends at the global, national, state, or local scales. Would avoid potential emissions by availability of wind to generate electricity as opposed to traditional fossil fuel–powered plants.	Same as Alternative B.	Slightly reduced GHG emissions compared to Alternative B due smaller footprint and fewer turbines installed. Slightly fewer potential avoided emissions compared to Alternative B.	Least GHGs emissions. Least potential avoided emissions.	Slightly reduced GHG emissions compared to Alternative B due smaller footprint and fewer turbines installed. Fewer potential avoided emissions compared to Alternatives B and C.	Slightly reduced from Alternative B due to smaller footprint and fewer turbines installed. Fewer GHG emissions compared to Alternatives B and C due to smaller footprint, fewer turbines, and reduced number of vehicle trips. Less estimated avoided emissions if the capacity of the project is reduced.
Cultural resources (main EIS)	Physical impacts to cultural resources from ground-disturbing project activities. These physical impacts could also affect culturally important wildlife, vegetation, or waters in a manner that diminishes Tribal treaty rights or changes subsistence practices and cultural relationships to the wildlife and their habitats. See the Wildlife, Vegetation, and Water and Wetland Resources issues in this table for how these resource patterns or availability would be changed by the project. Total ground disturbance acreage: 9,114. Previously recorded cultural resources in the project siting corridors: 243 sites. Non-physical impacts on cultural resources from visual changes and increased noise where setting, feeling, or association are important site characteristics. Non-physical impacts could also affect culturally important wildlife, vegetation, or waters in a manner that diminishes treaty rights or changes subsistence practices and cultural relationships to the wildlife and their habitats. See the Wildlife, Vegetation, and Water and Wetland Resources issue in this table for how these resource patterns or availability would be changed by the project. Known susceptible cultural resources would experience major degrees of visual change in the immediate foreground, such as identified at key observation point (KOP) 1 (Minidoka NHS Visitor Center) and KOP 10 (Wilson Butte Cave). Previously recorded susceptible cultural resources within the visual component of the non-physical APE: 1,787. Previously recorded susceptible cultural resources within the auditory component of the non-physical APE: 50. Non-physical (audible) impact to the current setting and feeling of Minidoka NHS and Minidoka War Relocation Center (WRC) from increased sound levels during operation; total acreage of overlap of the auditory component of the non-physical APE: Minidoka NHS (388 acres), Minidoka WRC (26,357 acres)	Same as Alternative B except additional avoidance and minimization measures would further reduce adverse physical and non-physical impacts to cultural resources (including resources described under treaties), such as by minimizing ground disturbance and potential fugitive dust. Reduced degree of visual change observed from cultural resources susceptible to visual impacts. Reduced change in Tribal treaty areas that could affect resource patterns or availability in patterns. Minimized non-physical auditory impacts.	Same as Alternative B with Additional Measures but decreased potential for physical impacts to cultural resources, including resources within Tribal treaty areas, due to smaller ground-disturbance footprint (6,953 acres; 24% less than Alternative B). Previously recorded cultural resources in the project siting corridors: 196 sites (19% less sites than Alternative B). Less potential for physical impacts to cultural resources within and associated with Minidoka WRC than Alternative B (84% less siting corridor overlap) or Alternative D but more potential for impacts than Alternative E and the Preferred Alternative. Reduced non-physical effects compared to Alternative B. Specifically, reduced visual and auditory impacts as seen from susceptible cultural resources, such as Minidoka NHS, and the National Register of Historic Places–listed Wilson Butte Cave. Previously recorded susceptible cultural resources within the visual component of the non-physical APE: 1,599 (11% less than Alternative B). Previously recorded susceptible cultural resources within the auditory component of the non-physical APE: 35 (30% less than Alternative B). Operational noise would not be audible at Minidoka NHS (100% less than Alternative B). Operational noise would be audible within 9,102 acres of the Minidoka WRC (65% less than Alternative B).	Same as Alternatives B and C but decreased potential for physical impacts to cultural resources, including resources within Tribal treaty areas, due to smaller ground-disturbance footprint (4,838 acres; 47% less than Alternative B and 30% less than Alternative C). Previously recorded cultural resources in the project siting corridors: 161 sites (34% less sites than Alternative B and 18% less than Alternative C). Less potential for physical impacts within Minidoka WRC than Alternative B (60% less siting corridor overlap) but more potential for physical impacts within Minidoka WRC than Alternative C, E, and the Preferred Alternative. Least potential non-physical visual impacts than all other action alternatives, and the second-lowest potential auditory impacts to cultural resources after Alternative E. Previously recorded susceptible cultural resources within the visual component of the non-physical APE: 1,556 (13% less than Alternative B and 3% less than Alternative C). Previously recorded susceptible cultural resources within the auditory component of the non-physical APE: 29 (42% less than Alternative B and 17% less than Alternative C). Operational noise would not be audible at Minidoka NHS (100% less than Alternative B and the same as Alternative C). Operational noise would be audible within 11,441 acres of the Minidoka WRC (57% less than Alternative B, and 26% more than Alternative C).	Same as Alternatives B, C, and D but slightly increased project footprint in the area of potential physical impacts to cultural resources, including resources within Tribal treaty areas, compared to Alternative D (Alternative E ground disturbance footprint at 5,136 acres would be 44% less than Alternative B, 26% less than Alternative C, and only 6% more than that of Alternative D). However, a slightly lower potential for physical impacts to cultural resources compared to Alternatives B–D. Previously recorded cultural resources in the Alternative D project siting corridors: 154 sites (37% less sites than Alternative B, 21% less than Alternative C, and 4% less than Alternative D). Second-greatest reduction of potential for physical impacts within Minidoka WRC (including 96% less siting corridor overlap than Alternative B). Slightly greater extent of potential visual impacts to susceptible cultural resources than Alternative D. However, increased reduction in visual impacts at Minidoka NHS and Oregon Trail and other cultural resources south and southwest of the project as compared to other action alternatives. Alternative E would have fewer potential auditory impacts than Alternatives B and C but slightly more than Alternative D. Previously recorded susceptible cultural resources within the visual component of the non-physical APE: 1,560 (13% less than Alternative B, 2% less than Alternative C, and 0.3% more than Alternative D). Previously recorded susceptible cultural resources within the auditory component of the non-physical APE: 28 (44% less than Alternative B, 20% less than Alternative C, and 3% less than Alternative D). Operational noise would not be audible at Minidoka NHS or Minidoka WRC (100% less than Alternative B and proportionally less than Alternative C).	Same as Alternatives B, C, and D but least overall potential for physical impacts to cultural resources, including resources within Tribal treaty areas (Preferred Alternative ground disturbance footprint at 4,492 acres would be 51% less than Alternative B, 35% less than Alternative C, 7% less than Alternative D, and 13% less than Alternative E). Previously recorded cultural resources in the project siting corridors: 147 sites (40% less sites than Alternative B, 25% less than Alternative C, 9% less than Alternative D, and 5% less than Alternative E). Greatest reduction of potential for physical impacts within Minidoka WRC (including 100% less siting corridor overlap than Alternative B); Preferred Alternative siting corridors do not overlap with Minidoka WRC. Reduced extent of potential visual impacts to susceptible cultural resources, marginally higher than Alternatives D and E and less than Alternatives B and C. Greatest reduction in visual impacts at Minidoka NHS, Wilson Butte Cave, and other cultural resources south and southwest of the project, except at the Oregon Trail, where Alternative E would have fewer impacts to trail segments compared to other alternatives. Operational noise would not be audible at Minidoka NHS or Minidoka WRC, with the same reduction in auditory impacts as Alternative E. The Preferred Alternative would have the fewest auditory impacts of all of the action alternatives. Previously recorded susceptible cultural resources within the visual component of the non-physical APE: 1,599 (11% less than Alternative B, the same as Alternative C, 3% more than Alternative D, and 2% more than Alternative E). Previously recorded susceptible cultural resources within the auditory component of the non-physical APE: 27 (46% less than Alternative B, 23% less than Alternative C, 7% less than Alternative D, and 4% less than Alternative E). Lowest degree of visual change and impact to susceptible cultural resources

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
						of all action alternatives (see EIS Section 3.5). The Preferred Alternative would have the fewest turbines. Alternative E would have either fewer or more turbines than Alternative D, depending on the type of turbines selected (3 MW or 6 MW), and these alternatives would have fewer turbines than Alternatives B and C. Reduction in the number of turbines under the Preferred Alternative would reduce changes in Tribal treaty areas that could affect resource patterns or availability as compared to any other action alternative. Fewer turbines would result in fewer potential cumulative visual and auditory impacts to cultural resources susceptible to such impacts.
Environmental justice communities (main EIS)	Impacts to low-income, minority, and Tribal populations through increased noise, increased traffic, increased dust and air pollution, shadow flicker, and changes to the visual character of the analysis area. Low-income, minority, and Tribal populations would be subject to disproportionately high and adverse effects because they make up most of the population in the affected area. Degree of potential impacts greatest for environmental justice populations closest to the siting corridors and haul routes (i.e., several scattered rural residences within 0–2 miles). Would impact dispersed environmental justice populations, including the Japanese American and Minidoka-connected communities and Tribes, from project-related effects to resources of concern, including Minidoka WRC, Minidoka NHS, and Native American resources of concern. Could also impact culturally important wildlife, vegetation, or waters in a manner that diminishes treaty rights. The Japanese American and Minidoka-connected communities and Tribes would be subject to disproportionate high and adverse effects from changes to the setting, feeling, and visitor experience at Minidoka WRC and Minidoka NHS and to physical and non-physical impacts to cultural resources.	Same as Alternative B except additional avoidance and minimization measures would further minimize potential physical and non-physical impacts to Native American resources of concern and would further reduce or avoid visual impacts to all environmental justice populations.	Compared to Alternative B, fewer environmental justice residences and communities near the western siting corridors and haul routes would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternatives D and E, more environmental justice communities near the southern and eastern siting corridors would be subject to disproportionately high and adverse effects. Disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur, although the magnitude of potential effects to them would be further reduced compared to Alternative B due to the smaller siting corridors footprint.	Compared to Alternatives B and C, fewer environmental justice residences and communities in the western and eastern portions of the siting corridors would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternative E, the number of impacted communities would be similar, but the location of impacted communities would differ. Disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur, although the magnitude of impacts would be further reduced in the eastern corridors compared to Alternatives B and C due to the reduced footprint of corridors.	Compared to Alternatives B and C, fewer environmental justice residences and communities near the western and southern siting corridors and haul routes would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternative D, the number of impacted communities would be similar, but the location of impacted communities would differ. Disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur, although impacts to the Japanese American community would be further reduced in the southern corridors compared to Alternatives B and C due to avoidance of the Minidoka WRC, and impacts to the Native American community would be the same as Alternative D but spatially distributed differently.	Compared to all other action alternatives, fewer environmental justice residences and communities would be subject to disproportionately high and adverse effects due to the smallest siting corridor footprint. Disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur, although impacts to the Japanese American community would be further reduced compared to all other action alternatives due to avoidance of the Minidoka WRC, and impacts to the Native American community would be further reduced due to the smaller siting corridors footprint.
Community services, employment, and housing availability (EIS Appendix 15)	Increased demand for community services such as public schools or law enforcement during construction due to short-term increased population (0.35%–0.75% increase in total population during construction). No long-term population increase or demand for community services (0.02%–0.07% increase in population during operation). Beneficial effects on community services from increased tax revenues during 34-year life of the project.	Same as Alternative B.	Same as Alternative B but reduced tax revenues due to fewer turbines.	Same as Alternative B but reduced construction work force (100–150 fewer workers during construction and 3–13 fewer workers during operation) and reduced tax revenues as compared to Alternatives B and C due to fewer turbines.	Same as Alternative B but reduced construction work force and reduced tax revenues as compared to Alternatives B and C due to fewer turbines.	Same as Alternative B but reduced construction work force and reduced tax revenues as compared to Alternatives B and C due to fewer turbines.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Local and regional economy (EIS Appendix 15)	Beneficial effects on local and regional economy due to project-related spending ($277.80 million total economic output per year of construction [similar for decommissioning] and $15 million per year of operation) and annual tax revenues ($43.95 million per year of construction [similar for decommissioning] and $4.53 million per year of operation).	Same as Alternative B.	Reduced economic output as compared to Alternative B due to fewer turbines, less equipment needs, and reduced generation capacity. Economic benefits (estimated economic output and tax revenue) would be reduced by 5%–25% from Alternative B.	Reduced economic output as compared to Alternatives B and C due to less personnel, fewer turbines, less equipment needs, and reduced generation capacity. Economic benefits (estimated economic output and tax revenue) would be reduced by 25%–50% from Alternative B.	Same as Alternative D.	Same as Alternative D.
Residential property values (EIS Appendix 15)	Potential decrease in residential property value due to the proximity and visibility of wind turbines for residences in the immediate foreground (0–2 miles) and foreground (2–10 miles) of the siting corridors; however, the likelihood or degree to which this may occur cannot be predicted with any certainty.	Additional measures would further reduce the potential for turbines to visually impact surrounding residences and therefore reduce the influence that turbine visibility could have on property values.	Same as Alternative B with Additional Measures.	Same as Alternative B with Additional Measures.	Same as Alternative B with Additional Measures with the second-fewest residences potentially affected.	Same as Alternative B with Additional Measures with the fewest residences potentially affected.
Fire and fuels management (main EIS)	Highest likelihood of fire ignition because largest ground-disturbance footprint: 9,114 acres. Most fragmentation of fuels, which could slow wildfire spread in the siting corridors.* Most grass-shrub (GS2) fuels in siting corridors: 7,157 acres. Most potential for nonnative invasive plants, which alter fire regimes. Most accessibility for on-the-ground fire responders (because more roads).† Most changes to navigable airspace due to the largest project footprint. Range improvements could provide additional water access points for suppression activities.‡ The project would limit the application and effectiveness of fuels reduction and habitat restoration projects that are part of the integrated program of work (IPOW).	Same as Alternative B except additional measures would reduce the potential for equipment and operation-related ignitions, therefore reducing the frequency of fires related to project activities.	Second-highest likelihood of fire ignition because second-largest ground-disturbance footprint: 6,953 acres. Second-most fragmentation of fuels, which could slow wildfire spread in the siting corridors.* Second-fewest GS2 fuels in siting corridors: 4,258 acres. Second-highest potential for nonnative invasive plants, which alter fire regimes. Second-most accessibility for on-the-ground fire responders (because more roads).† Second-most changes to navigable airspace due to the larger project footprint. Range improvements could provide additional water access points for suppression activities.‡ Impacts on IPOW treatments would be similar to Alternative B with Additional Measures.	Second-lowest likelihood of fire ignition because smallest ground-disturbance footprint: 4,838 acres. Second-lowest fragmentation of fuels, which could slow wildfire spread in the siting corridors.* Second-most GS2 fuels in siting corridors: 4,299 acres. Second-lowest potential for nonnative invasive plants, which alter fire regimes. Second-least accessibility for on-ground fire responders (because fewer roads).† Third-least changes to navigable airspace due to the smaller project footprint. Least availability of water access points for fire suppression.‡ Impacts on IPOW treatments would be similar to Alternative B with Additional Measures.	Third-lowest likelihood of fire ignition because smaller ground-disturbance footprint: 5,136 acres. Third-lowest fragmentation of fuels, which could slow wildfire spread in the siting corridors.* Second-lowest GS2 fuels in siting corridors: 2,434 acres. Third-lowest potential for nonnative invasive plants, which alter fire regimes. Third-least accessibility for on-ground fire responders (because fewer roads).† Second-least changes to navigable airspace due to the smallest project footprint. Least availability of water access points for fire suppression.‡ Impacts on IPOW treatments would be similar to Alternative B with Additional Measures.	Fewest siting corridors so lowest risk of human-caused ignition (4,492 acres of ground disturbance), greater fuel continuity, and more area unchanged from existing fire regime and rate of spread. Fewest GS2 fuels (2,244 acres) and lowest ignition probability. Lowest potential for spread and establishment of invasives. Lower risk of wildfire ignition, a potentially higher potential for wildfire spread, a reduced wildfire ground response capacity, an increased aerial wildfire suppression capacity, and a lower risk from impacts of invasive plants. Less fragmented landscape with a higher degree of fuel continuity, potentially increasing the risk of wildfire spread. Least accessibility for on-the-ground fire responders (because fewer roads).† Fewest changes to navigable airspace due to the smallest project footprint. Fewer anthropogenic incursions, decreasing the frequency and volume of human-caused ignitions; less need for fire response. Impacts on IPOW treatments would be similar to Alternative B with Additional Measures.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Land use and realty (EIS Appendix 15)	Compatible with agricultural zoning districts but may conflict with residential, recreational, or natural resource uses, which would be subject to review and further consideration through the counties' permitting processes. The siting corridors would overlap 4,449 acres of Minidoka WRC. Turbine installation in these areas would not be in conformance with the BLM's interim management for Minidoka WRC as a potential area of critical environmental concern (ACEC). MVE would need to shift the proposed turbines from within Minidoka WRC to other Alternative B turbine siting corridors or develop compensatory mitigation to be in conformance with the BLM's interim management. Siting corridors would overlap 143.0 acres of designated ROW corridors; however, infrastructure would be sited to avoid impacting existing ROW corridors. Existing land uses may be temporarily precluded from the siting corridors (84,051 acres) for temporary durations and would be permanently precluded where permanent infrastructure is sited (9,114 acres). Would be designed to minimize interference with communication systems and adhere to FAA requirements. Would introduce new obstructions to the analysis area and is likely to have some adverse impact on airspace; however, would not significantly impact aerial operations or reduce the usefulness of the existing overlying FAA airspace, except for within 500 feet of obstructions. No significant impact to the use of the identified and registered airports in the analysis area.	Same as Alternative B except additional avoidance and minimization measures to coordinate with FAA and avoid electromagnetic field interference at communication sites would reduce the potential for land use conflicts between Alternative B and communication systems or FAA uses. Compared to Alternative B, potential for aviation impacts would be further minimized through increased coordination with the FAA, regional airports, and aviation-related stakeholders.	Same as Alternative B with Additional Measures but reduced potential for conflicts with existing authorization holders and future land use requests in the western project vicinity due to smaller project footprint: 18,836 less siting acres in siting corridor. 2,161 less acres of long-term land use conversions. 49.1 less acres of overlap with designated ROW corridors. Alternative C would not be in conflict with the BLM's interim management of the potential ACEC for Minidoka WRC because the Alternative C turbine siting corridors do not overlap Minidoka WRC. Impacts to communication sites would be the same as Alternative B with Additional Measures. Same aviation impacts as Alternative B except impacts would be reduced by approximately 22% due to the reduced footprint of siting corridors and total number of turbines.	Same as Alternative C but reduced potential for conflicts with existing authorization holders and future land use requests, particularly east of Hidden Valley Road: 16,618 less siting acres in siting corridor. 2,115 less acres of long-term land use conversions. 36.2 less acres of overlap with designated ROW corridors. Similar to Alternative B, this alternative would not be in conformance with the BLM's interim management for Minidoka WRC as a potential ACEC. However, Alternative D siting corridors would affect 2,690 less acres of Minidoka WRC than Alternative B. Same aviation impacts as Alternative B except impacts would be reduced by approximately 42% due to the reduced footprint of siting corridors and total number of turbines.	Same as Alternative C but reduced potential for conflicts with existing authorization holders and future land use requests, particularly in the southern portion of the project near Minidoka NHS: 14,535 less siting acres in siting corridor. 1,817 less acres of long-term land use conversions. 10.2 less acres of overlap with designated ROW corridors. Similar to Alternative C, this alternative would not be in conflict with the BLM's interim management of the potential ACEC for Minidoka WRC because the turbine siting corridors do not overlap Minidoka WRC. Same aviation impacts as Alternative B except impacts would be reduced by approximately 40% due the reduced footprint of siting corridors and total number of turbines.	Same as Alternative C but reduced potential for conflicts with existing authorization holders and future land use requests, particularly in the southern portion of the project near Minidoka NHS: 20,447 less siting acres in siting corridor. 2,461 less acres of long-term land use conversions. 12.5 less acres of overlap with designated ROW corridors. Similar to Alternative C, this alternative would not be in conflict with the BLM's interim management of the potential ACEC for Minidoka WRC because the turbine siting corridors do not overlap Minidoka WRC. Same aviation impacts as Alternative B except impacts would be reduced by approximately 47% due to the reduced footprint of siting corridors and total number of turbines. Depending upon the final turbine layout, the Preferred Alternative's maximum tip height of 660 feet for all turbines may further reduce impacts.
Grazing allotments and range socioeconomics (EIS Appendix 15)	Minor long-term (1.3% or less) and permanent (less than 1%) reductions in acreage of eight BLM grazing allotments due to infrastructure disturbance. Temporary, long-term, and permanent reduced forage availability, which would vary in magnitude for individual permittees (from 0% to 34.9%). There is the potential for reduced income, profitability, and economic stability for grazing permittees in seven grazing allotments during construction and decommissioning and eight allotments during operation and final reclamation due to temporary and long-term forage reductions, which could affect the broader livestock grazing community. Sufficient AUMs are available to provide grazing for all permitted sheep AUMs.	Same as Alternative B except additional avoidance and minimization measures would 1) reduce the potential for weeds to replace desirable forage and 2) further minimize the potential reduction in livestock forage and therefore reduce impacts to the livestock grazing economy.	Reduced forage availability in five allotments instead of eight under Alternative B. Throughout the project, less acres and forage availability would be affected in the North Milner allotment and more acres and forage availability would be affected in the Camp I allotment under Alternative C than under Alternative B. The impacts to the Sid Butte allotment would be the same, and there would be less acres affected in the Star Lake allotment. There would be a reduced magnitude of impacts to grazing permittees and the livestock grazing community compared to Alternative B (impacts would be lessened by 9% during construction and decommissioning, 22% during operation and final reclamation, and 24% post-project).	Reduction in forage availability in five allotments. Flat Top, Hunt, and Wildhorse allotments would not have any change in forage availability, and the acreage of the Sid Butte allotment (and forage availability) affected would be the least of all action alternatives. There would be a reduced magnitude of impacts to grazing permittees and the livestock grazing community compared to Alternative B (lessened by 69% during construction and decommissioning, 40% during operation and final reclamation, and 39% post-project as compared to Alternative B).	Reduction in forage availability in four allotments. Flat Top, Hunt, South Milner, and Wildhorse allotments would not have any changes in forage availability, and the acreage of the Star Lake allotment (and forage availability) affected would be the second least of all action alternatives. There would be a reduced magnitude of impacts to grazing permittees and the livestock grazing community compared to Alternative B (lessened by 17% during construction and decommissioning, 41% during operation and final reclamation, and 41% post-project as compared to Alternative B).	Reduction in forage availability in four allotments, similar to Alternative E. Flat Top, Hunt, South Milner, and Wildhorse allotments would not have any changes in forage availability, and the acreage of the Star Lake allotment (and forage availability) affected would be the least of all action alternatives. There would be a reduced magnitude of impacts to grazing permittees and the livestock grazing community compared to Alternative B (lessened by 33% during construction and decommissioning, 54% during operation and final reclamation, and 54% post-project as compared to Alternative B).

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
	Sheep permittees may need to be accommodated off-site during construction and reclamation at the discretion of each permittee.					
Physiological effects to livestock (EIS Appendix 15)	Potential for physiological effects to livestock from noise and blasting during construction and decommissioning.	Same as Alternative B.	Potential for physiological effects to livestock would be the same as Alternative B except that only seven allotments would have work area or infrastructure disturbance. The Flat Top allotment would not be impacted.	Least overall potential for physiological effects in the Sid Butte allotment due to the smallest disturbance within that allotment. Only six allotments would have work area or infrastructure disturbance. Flat Top and Wildhorse allotments would not be impacted.	Potential for physiological effects to livestock would be the same as Alternative B except only five allotments would have work area or infrastructure disturbance. Flat Top, Hunt, and South Milner allotments would not be impacted.	The potential for physiological effects would be the same as Alternative E except the Preferred Alternative would result in the fewest potential stressors to livestock because the least number of acres of allotments would be affected. Within the Sid Butte and Star Lake allotments, there would be 22% and 6% less acres (respectively) affected compared to Alternative E, whereas the effects in the Camp I, North Milner, and Wildhorse allotments would be the same as Alternative E.
Paleontological resources (EIS Appendix 15)	Possible loss of paleontological resources through disturbance to geologic units with high or moderate potential to yield fossils (Quaternary-age alluvial and lacustrine [or playa] deposits).	Same as Alternatives B except additional avoidance and minimization measures would reduce or avoid impacts to cave deposits and ensure that unknown paleontological resources are analyzed and mitigated if necessary.	Same as Alternative B with Additional Measures but reduced magnitude of impacts because slightly less acres of potential disturbance to Quaternary-age alluvial and lacustrine (or playa) deposits. More potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits than Alternatives D, E, and the Preferred Alternative.	Same as Alternative B with Additional Measures but least potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits and potential paleontological resources they may contain.	Same as Alternative B with Additional Measures but reduced magnitude of impacts because slightly less acres of potential disturbance to Quaternary-age alluvial and lacustrine (or playa) deposits. More potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits than Alternative D and the Preferred Alternative.	Same as Alternative B with Additional Measures but reduced magnitude of impacts because slightly less acres of potential disturbance to Quaternary-age alluvial and lacustrine (or playa) deposits. More potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits than Alternative D.
Pollinators (EIS Appendix 15)	Largest ground-disturbance footprint (5,667 acres) and most new and improved access roads in native vegetation communities, as well as the most turbines. Would result in the most habitat loss or alteration, most displacement of pollinators, and the most injury or mortality from collisions with turbines or vehicles and from herbicide exposure. Would affect individual pollinators but unlikely to cause a loss in population viability.	Same as Alternative B except additional avoidance and minimization measures would minimize impacts to pollinator habitat and restrict the use of herbicides that may be harmful to pollinators.	Same as Alternative B with Additional Measures except reduced ground disturbance (4,355 acres) and access road construction in native vegetation communities and fewer turbines. Therefore, less loss or alteration of pollinator habitat, less displacement of pollinators, and less injury or mortality from collisions with turbines or vehicles and from herbicide exposure.	Same as Alternative C except least ground disturbance (2,995 acres) and access road construction in native vegetation communities; only Alternative E and the Preferred Alternative would have fewer turbines. Therefore, least loss or alteration of pollinator habitat, least displacement of pollinators, and least injury or mortality from collisions with vehicles or herbicide exposure. Only Alternative E and the Preferred Alternative would result in less injury or mortality of pollinators from collisions with turbines.	Same as Alternative C but reduced ground disturbance (3,522 acres) and access road construction in native vegetation communities; second-least turbines of the action alternatives. Therefore, less alteration of pollinator habitat, pollinator displacement, and injury or mortality from vehicle collisions or herbicide exposure than Alternatives B and C, but more than Alternative D and the Preferred Alternative. Second-least injury or mortality of pollinators from collisions with turbines.	Same as Alternative C but reduced ground disturbance (3,085 acres) and access road construction in native vegetation communities; fewest turbines of the action alternatives. Therefore, second-least loss or alteration of pollinator habitat, pollinator displacement, and injury or mortality from vehicle collisions or herbicide exposure. Least injury or mortality of pollinators from collisions with turbines
St. Anthony sand dune tiger beetle (EIS Appendix 15)	0.63 acre of St. Anthony sand dune tiger beetle habitat loss, alteration, and fragmentation from ground disturbance and direct injury or mortality from crushing. Unlikely to cause, or contribute to, a trend toward listing under the ESA.	Same as Alternative B except additional avoidance and minimization measures would minimize effects to the tiger beetle and its habitat by further limiting disturbance in potential habitat and restricting pesticide applications.	Same as Alternative B with Additional Measures.	Same as Alternative B with Additional Measures except 0.04 less acre of ground disturbance in St. Anthony sand dune tiger beetle habitat.	Same as Alternative B with Additional Measures except 0.03 less acre of ground disturbance in St. Anthony sand dune tiger beetle habitat.	Same as Alternative D.
Monarch butterfly (EIS Appendix 15)	Loss or alteration of 11% of modeled monarch breeding habitat in the siting corridors from ground disturbance (greatest of the action alternatives). Greatest amount of new and improved access roads in modeled monarch breeding habitat and associated injury or mortality from vehicle collisions and herbicide applications. May affect individual monarch butterfly and localized habitat.	Same as Alternative B except additional avoidance and minimization measures would minimize effects by implementing monarch butterfly clearance surveys prior to construction, maintenance, or decommissioning activities that occur from May through October; reducing the need for herbicide applications by minimizing the potential for introduction and spread of invasive plant species, which may degrade habitat; and avoiding the use of insecticides and pesticides.	Same as Alternative B with Additional Measures except second-greatest amount (10%) of modeled monarch breeding habitat in the siting corridors removed or altered. Slightly reduced amount of new and improved access roads in modeled monarch breeding habitat and associated injury or mortality from vehicle collisions and herbicide applications.	Same as Alternative C except least amount (3%) of modeled monarch breeding habitat in the siting corridors removed or altered. Least injury or mortality from vehicle collisions and herbicide applications due to fewest miles of access road construction in modeled monarch breeding habitat.	Same as Alternative C but only 9% of modeled monarch breeding habitat in the siting corridors removed or altered. Slightly reduced amount of new and improved access roads in modeled monarch breeding habitat and associated injury or mortality from vehicle collisions and herbicide applications compared to Alternatives B, C, and the Preferred Alternative but much greater amount than Alternative D.	Approximately the same amount (9%) of modeled monarch breeding habitat in the siting corridors removed or altered as Alternative E. Slightly reduced amount of new and improved access roads in modeled monarch breeding habitat and associated injury or mortality from vehicle collisions and herbicide applications compared to Alternatives B, C, and E but much greater amount than Alternative D

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
BLM special-status bumble bees (EIS Appendix 15)	Similar impacts to pollinators described above, except that existing bumble bee nests or rodent burrows that could be used by nesting bumble bees could also be destroyed by ground-disturbing activities in native vegetation communities. Thus, localized effects on BLM special-status bumble bee populations and their general abundance are unlikely to cause, or contribute to, a trend toward listing under the ESA.	Same as Alternative B except additional avoidance and minimization measures would minimize effects to BLM special-status bumble bee by requiring clearance surveys prior to construction, maintenance, or decommissioning activities that occur from May through October, reducing the need for herbicide applications by minimizing the potential for introduction and spread of invasive plant species, which may degrade bumble bee habitat, and avoiding the use of insecticides and pesticides.	Same as Alternative B with Additional Measures except reduced magnitude of effects because reduced ground disturbance in native vegetation communities.	Same as Alternative C except lowest magnitude of effects from alteration of pollinator habitat, displacement of pollinators, and injury or mortality from collisions with vehicles or herbicide exposure because least ground disturbance in native vegetation communities.	Reduced magnitude of effects compared to Alternatives B and C because reduced ground disturbance in native vegetation communities.	Reduced magnitude of effects compared to Alternatives B, C, and E because reduced ground disturbance in native vegetation communities.
Recreation (EIS Appendix 15)	Temporary restriction of public access for hunting and trapping and off-highway vehicle use in siting corridors during construction. Creation of new off-highway vehicle use access and opportunities in siting corridors over the long term. Public lands to remain open to hunting and access improved, but hunting opportunities diminished in the affected game management units (GMUs) due to biological effects to game species during operation.	Same as Alternative B except additional avoidance and minimization measures would reduce the potential for biological effects to big game and other wildlife species that would diminish hunting opportunities.	Same as Alternative B with Additional Measures except reduced magnitude of impacts due to smaller siting corridor footprint and reduced potential for habitat fragmentation, particularly north of ID 24 and in the western portion of siting corridors. Reduced operational access improvements due to fewer miles of new roads and fewer miles of improved roads compared to Alternative B.	Same as Alternative C but further reduced effects to hunting and trapping access and opportunities in GMU 53 due to the removal of the siting corridors east of Crestview Road. Second-fewest effects to hunting and trapping access and opportunities.	Same as Alternative D except siting corridors retained east of Crestview Road but not in the southwestern portion of the project.	Same as Alternative D, but further reduced effects to hunting and trapping access and opportunities due to the removal of the southern siting corridors. Fewest effects to hunting and trapping access and opportunities.
Soils (EIS Appendix 15)	Ground disturbance (9,114 acres) would impact soils through loss of vegetation, topsoil mixing, burial and compaction of soil crusts, soil horizon mixing, and seedbank disturbance. 1,965 acres permanent disturbance in very fragile soils where reclamation potential is limited, where concrete foundations remain post-project, and where roads are left in place. Applicant-committed measures would reduce, but not eliminate, impacts on soils.	Same as Alternative B except additional avoidance and minimization measures would further reduce impacts to soils and plant growth materials by reducing the potential disturbance to farmland and wet soils and by extending all applicant-committed measures for construction to apply to operation and maintenance phases and decommissioning.	Same as Alternative B with Additional Measures but fewer impacts to sensitive soils, soil health, and plant growth material quantity and quality due to fewer acres of ground disturbance (6,953 acres) and reduced permanent ground disturbance (1,602 acres).	Same as Alternative B with Additional Measures but second-smallest ground-disturbance footprint (4,838 acres) and reduced permanent disturbance (1,301 acres), therefore fewer impacts to sensitive soils, soil health, and plant growth material quantity and quality.	Same as Alternative B with Additional Measures but fewer impacts to sensitive soils, soil health, and plant growth material quantity and quality due to less acres of ground disturbance (5,136 acres) and second-least acres of permanent disturbance (1,270 acres).	Same as Alternative B with Additional Measures but fewest impacts to sensitive soils, soil health, and plant growth material quantity and quality due to least acres of ground disturbance (4,492 acres) and least acres of permanent disturbance (1,115 acres).
Transportation (EIS Appendix 15)	Construction would impact traffic patterns through increased vehicle and heavy haul trips, as well as temporary lane closures, detours, and increased congestion and travel times. Operation traffic would have no noticeable effect on existing roadways within the analysis area, and existing level of service (LOS) would remain unchanged. Greatest traffic impacts of the action alternatives.	Same as Alternative B except additional avoidance and minimization measures would reduce traffic pattern impacts by extending MVE's applicant-committed measures related to roads and traffic to all project phases, including maintenance during operation and decommissioning and limiting operational traffic volumes associated with winter road maintenance. Due to the extended duration of construction and decommissioning from 2 to 3 years, it would have the greatest construction- and decommissioning- related traffic impacts of all action alternatives.	Same as Alternative B with additional measures. The quantity of traffic and changes in annual average daily traffic (AADT) are higher than Alternative B (without additional measures) and may further degrade the forecasted LOS.	Fewest construction- and decommissioning-related traffic impacts of the action alternatives. Approximately 18% fewer trips than Alternative B (without additional measures) and fewer changes in AADT, which would reduce the potential for degraded LOS conditions.	Construction-related traffic would be less than Alternative C but greater than Alternatives B (without additional measures), D, and the Preferred Alternative. Decommissioning traffic impacts would be fewer than Alternatives B (without additional measures) and C but greater than Alternative D and the Preferred Alternative. Same types and magnitude of traffic impacts as Alternative D.	Second-fewest construction- and decommissioning-related traffic impacts of the action alternatives. Approximately 8% fewer trips than Alternative B (without additional measures) and fewer changes in AADT, which would reduce the potential for degraded LOS conditions.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Native upland vegetation communities (EIS Appendix 15)	Greatest loss or alteration of native upland vegetation communities from ground disturbance (5,473 acres) and greatest disturbance of native upland vegetation communities in very fragile soils (131 acres) where reclamation is unlikely to be successful. Interim reclamation of temporarily disturbed work areas and final reclamation following decommissioning would be required to meet BLM success criteria, which would minimize the potential impacts to native upland vegetation communities.	Same as Alternative B except additional avoidance and minimization measures would reduce impacts to native upland vegetation communities by expediting interim reclamation in temporary work areas and by expanding noxious weed control measures to apply to other invasive plants.	Same as Alternative B with Additional Measures except less loss or alteration of native upland vegetation communities from ground disturbance (4,199 acres) and less disturbance of native upland vegetation communities in very fragile soils (106 acres) where reclamation is unlikely to be successful.	Same as Alternative C except least loss or alteration of native upland vegetation communities from ground disturbance (2,895 acres) and second-least disturbance of native upland vegetation communities in very fragile soils (77 acres) where reclamation is unlikely to be successful.	Same as Alternative C except less loss or alteration of native upland vegetation communities from ground disturbance (3,410 acres) and less disturbance of native upland vegetation communities in very fragile soils (88 acres) where reclamation is unlikely to be successful.	Same as Alternative C except second-least loss or alteration of native upland vegetation communities from ground disturbance (2,988 acres) and least disturbance of native upland vegetation communities in very fragile soils (45 acres) where reclamation is unlikely to be successful.
BLM special-status plants (EIS Appendix 15)	No BLM special-status plants documented in siting corridors. Most ground disturbance (9,114 acres) and therefore greatest potential to impact unidentified populations of BLM special-status plants. Greatest amount of potential habitat for BLM special-status plants removed or altered. Potential impacts to unidentified BLM special-status plant populations minimized through implementation of preconstruction clearance surveys. Compensatory mitigation may be required if disturbance to any BLM special-status plant populations identified during preconstruction surveys is not avoided.	Same as Alternative B except additional avoidance and minimization measures would reduce effects by prohibiting activities to proceed where BLM special-status plants could be affected until it is determined that the loss of individual plants or populations would not contribute to a trend toward federal listing, or that sufficient mitigation measures (which may include compensatory mitigation) have been implemented to reverse such a trend. Would minimize the potential for the project to cause, or contribute to, a trend toward federal listing for BLM special-status plants.	Same as Alternative B with Additional Measures except ground disturbance (6,953 acres) reduced by 24% compared to Alternative B and less potential for impacts to BLM special-status plants and their habitat.	Same as Alternative B with Additional Measures except ground disturbance (4,838 acres) reduced by 47% compared to Alternative B and the second-least potential for impacts to BLM special-status plants and their habitat.	Same as Alternative B with Additional Measures except ground disturbance (5,136 acres) reduced by 44% compared to Alternative B and less potential for impacts to BLM special-status plants and their habitat.	Same as Alternative B with Additional Measures except ground disturbance (4,492 acres) reduced by 51% compared to Alternative B and the least potential for impacts to BLM special-status plants and their habitat.
Landscape character and scenic integrity (main EIS)	Project components visible from a large area surrounding the project. Potential to result in a major degree of visual change when viewed from the immediate foreground (0–2 miles) with approximately 99% of the visible acres affected and a moderate degree of visual change to the foreground (2–10 miles) with approximately 85 to 90% of visible acres affected.	Same as Alternative B except additional avoidance and minimization measures slightly reduce visual contrast on the landscape.	Similar effects to scenic quality and the degree of visual change as Alternative B with Additional Measures for both turbine heights (545 and 740 feet). Project components visible from immediate foreground (0–2 miles) with approximately 99% (both turbine heights) of visual areas affected (same as Alternative B) and decreased degree of visual change within foreground (2–10 miles) with approximately 80% (545-foot turbines) to 85% (740-foot turbines) of visible acres affected (a 5% decrease from Alternative B). Viewers along western edge of siting corridors would experience a decreased degree of visual change, including views at sensitive viewing locations like Minidoka NHS, Peaks to Craters Scenic Byway, and Wilson Butte Cave. Reduced visual change due to increased distance (between 1.0 and 4.7 miles per KOP compared to Alternative B) from the project.	Smaller overall area with turbine siting corridors compared to Alternatives B and C. Effects to scenic quality and degree of visual change would be less than Alternatives B and C. Project components would be visible from immediate foreground (0–2 miles) with approximately 98% (545-foot turbines) to 99% (740-foot turbines) of visible acres affected (similar to or 1% less than Alternative B). Within foreground (2–10 miles), decreased degree of visual change with approximately 75% (545-foot turbines) to 80% (740-foot turbines) of visible acres affected (an 8% to 10% decrease from Alternative B). Smaller overall turbine corridor areas would have reduced visual change to viewers from the eastern and western edge, including sensitive viewing locations like Minidoka NHS, Milner Historic Recreation Area, Wilson Butte Cave, and the Laidlaw Airstrip. Reduced visual change due to increased distance (between 0.8 and 5.2 miles per KOP compared to Alternative B) from the project.	Similar footprint size to Alternative D so overall total degree of visual change less than Alternatives B and C. Project components would be visible from immediate foreground (0–2 miles) with approximately 98% (545-foot turbines) to 99% (740-foot turbines) of visible acres affected (similar to or 1% less than Alternative B). Within foreground (2–10 miles), decreased degree of visual change with approximately 78% (545-foot turbines) to 83% (740-foot turbines) of visible acres affected (a 7% decrease from Alternative B). Lower impacts to sensitive viewing locations, including Minidoka NHS, Milner Historic Recreation Area, Wilson Butte Cave, and the Laidlaw Airstrip. Reduced visual change due to increased distance (between 1.6 and 7.2 miles per KOP compared to Alternative B) from the project from the reduced southern turbine corridors.	Similar footprint size to Alternative D and E so overall total degree of visual change less than Alternatives B and C. Project components would be visible with 99% of the analysis area in the immediate foreground, 84% of the foreground, 74% of the middleground, and 63% of the background. Effects to scenic quality would be similar to Alternative E with reduced impacts to Minidoka NHS Block 22 Barracks (KOP 2). The overall footprint of the project is reduced compared to all alternatives. Visual impacts to KOPs for the Preferred Alternative would be similar to or less than Alternative E due to the removal of turbines near Minidoka NHS and WRC (KOPs 1, 2 and 16). Minidoka Block 22 Barracks (KOP 2) shows reduced impacts compared to Alternative B, C, and D but similar to Alternative E. The number of turbines would be similar to Alternative D with the maximum turbine height (740 feet) but would be shorter under the Preferred Alternative (660 feet).

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Night skies (main EIS)	Would add new sources of artificial light during the construction phase and is anticipated to remain at a similar level to the current conditions of scattered light from nearby towns. Lighting would be installed at seven new substations, battery energy storage areas, and operation and maintenance facilities. Turbine lighting would be controlled by an ADLS system, which would keep aviation lighting off approximately 92% of the time. Night sky impacts at any given time would likely be less than scenario 5.	Same as Alternative B.	Similar changes in brightness as Alternative B with reduced impacts to viewers at KOPs 1, 2, 12, 13, 14, and 15.	Similar night sky conditions as Alternative C. There would be reduced night sky impacts to KOPs 1, 2, 4, 10, 13, and 16 and travel routes as compared to Alternative B.	Similar night sky impacts as Alternative C and D. There would be reduced night sky impacts to KOPs 1, 2, 3, 4, 10, and 16 compared to Alternative B.	Similar impacts to Alternative E. Night sky impacts would be reduced compared to Alternative B to viewers on the northern edge of the project at KOPs 7 and 8 and on the southeastern edge of the project at KOPs 3 and 4. Night sky impacts would be decreased near the Minidoka NHS KOPs (KOPs 1, 2, and 16) compared to Alternative B, C, and D.
Shadow flicker (EIS Appendix 15)	Out of 104 residences in the analysis area, up to 10 residences could be affected by shadow flicker under the 3-MW alternative and up to eight residences could be affected by shadow flicker under the 6-MW alternative.	Same as Alternative B except additional avoidance and minimization measures would slightly reduce shadow flicker effects.	Out of 104 residences in the analysis area, up to seven residences could be affected by shadow flicker under the 3-MW alternative, and up to six residences could potentially be affected by shadow flicker under the 6-MW alternative.	Out of the 104 in the analysis area, up to nine residences could be affected by shadow flicker under the 3-MW alternative, and up to eight residences could be affected by shadow flicker under the 6-MW alternative.	Out of the 104 residences in the analysis area, up to five residences could be affected by shadow flicker for both the 3- and 6-MW alternative.	Out of 104 residences in the analysis area, only three residences could be affected by shadow flicker as compared to the 3- and 6-MW turbine heights for Alternatives B, C, D, and E. Two residences would be affected for more than 30 hours, and one residence would be affected for fewer than 30 hours. The Preferred Alternative would have the lowest number of residences affected by shadow flicker compared to all other alternatives. This is less than approximately 3% of residences in the analysis area.
Groundwater quantity (EIS Appendix 15)	Total water use: approximately 589 acre-feet over 34 years. Project groundwater wells: six during construction; four to remain open during operation and decommissioning. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 123 acres annually for 2 years during construction. Groundwater use measurable, but not apparent to adjacent water users due to rapid groundwater recharge, including during highest project groundwater use (construction). Would not impact aquifer recharge to the Snake River.	Total water use: approximately 839 acre-feet over 36 years. Project groundwater wells: same as Alternative B. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 123 acres annually for 3 years during construction. Effects to existing groundwater wells near project (very small drawdowns) similar to Alternative B. Additional avoidance and minimization measures would further reduce impacts to groundwater quantity by ensuring existing conditions are thoroughly understood before construction so potential impacts can be avoided.	Total water use: approximately 805 acre-feet over 36 years. Project groundwater wells: five during construction; four to remain open during operation and decommissioning. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 118 acres annually for 3 years during construction. Effects to existing groundwater wells near project (very small drawdowns) similar to Alternative B. Additional avoidance and minimization measures same as Alternative B with Additional Measures.	Total water use: approximately 608 acre-feet over 36 years. Project groundwater wells: four during all project phases. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 90 acres annually for 3 years during construction. Effects to existing groundwater wells near project (very small drawdowns) similar to Alternative B. Additional avoidance and minimization measures same as Alternative B with Additional Measures.	Total water use: approximately 591 acre-feet over 36 years. Project groundwater wells: four during all project phases. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 87 acres annually for 3 years during construction. Effects to existing groundwater wells near project (very small drawdowns) similar to Alternative B. Additional avoidance and minimization measures same as Alternative B with Additional Measures.	Total water use: approximately 528 acre-feet over 36 years. Project groundwater wells: four during all project phases. Idaho consumptive irrigation requirement would require the water rights user where water would be purchased to pause irrigation on 77 acres annually for 3 years during construction. Effects to existing groundwater wells near project (very small drawdowns) similar to Alternative B. Additional avoidance and minimization measures same as Alternative B with Additional Measures.
Physical integrity of existing groundwater wells and canals (EIS Appendix 15)	Shallow wells (especially those without a steel casing or top sealing) within close proximity to blast sites could be impacted by blasting. Applicant-committed measures (site-specific geotechnical evaluation, pre- and post-blast surveys of wells within 300 feet of a blast, monitoring blasting activities within 300 feet of a well with a seismograph, and properly designed blasting plan) would minimize or avoid impacts. Number of wells within 1,000 feet of siting corridors: 72.	Additional avoidance and minimization measures would further reduce impacts to the physical integrity of existing groundwater wells and canals. Additional measures would require additional pre-blast inspections and reviews and implement a larger blast avoidance area. Number of wells within 1,000 feet of siting corridors: 72.	Same types of effects as Alternative B with Additional Measures but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater wells and canals from blasting. Number of wells within 1,000 feet of siting corridors: 54.	Same types of effects as Alternative C but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater wells and canals from blasting. Number of wells within 1,000 feet of siting corridors: 21.	Same types of effects as Alternative C but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater wells and canals from blasting. Number of wells within 1,000 feet of siting corridors: 49.	Same types of effects as Alternative C but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater wells and canals from blasting. Number of wells within 1,000 feet of siting corridors: 53.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Groundwater quality (EIS Appendix 15)	Project blasting could encounter groundwater in areas where the depth to groundwater is shallow or where there is a perched aquifer, which could create a pathway for surface water to mix with groundwater. A site-specific geotechnical evaluation of each turbine and infrastructure site would be completed prior to construction; this would help identify areas with shallow groundwater. MVE's final Blasting Plan would be designed to accommodate the hydrogeologic conditions and existing wells or other underground infrastructure in the area. No turbines would be placed within 1,000 feet of irrigation canals.	Additional avoidance and minimization measures would further reduce impacts to groundwater quality. Additional measures would require additional pre-blast inspections and reviews and implement a larger blast avoidance area.	Same types of effects as Alternative B with Additional Measures but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater quality from blasting.	Same types of effects as Alternative C with Additional Measures but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater quality from blasting.	Same types of effects as Alternative C with Additional Measures but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater quality from blasting.	Same types of effects as Alternative C with Additional Measures but extent would be less because less blasting would be required (because there would be fewer turbines); therefore, less potential for impacts to existing groundwater quality from blasting.
Wetlands and surface waters (EIS Appendix 15)	Project siting would avoid and minimize placement of project infrastructure in wetlands and drainages to the extent practicable; however, roads and electrical lines would cross some drainages, and work areas may require siting within some wetlands or drainages. Ground disturbance in wetlands would remove or alter wetlands, change their function, change the rate and quantity of runoff from the fill footprint, compact soils, and alter flow patterns. Applicant-committed measures would reduce but not eliminate impacts to wetlands and waters. If avoidance of wetlands is not practicable, MVE would prepare site-specific plans and measures (e.g., erosion and sediment control measures, culverts sized in accordance with U.S. Army Corps of Engineers and BLM standards) to mitigate impacts. Total acres of wetland impacts: 59.	Same as Alternative B, with additional avoidance and minimization measures that would increase the likelihood of wetland avoidance and further reduce impacts to wetlands and surface waters by minimizing impacts to drainage and runoff patterns, wetland habitat, and wetland soils. Total acres of wetland impacts: 59.	Same as Alternative B with Additional Measures but would require less ground disturbance in wetlands and waters. Total acres of wetland impacts: 50.	Same as Alternative B with Additional Measures but would require the least amount of ground disturbance in wetlands and waters of the action alternatives. Total acres of wetland impacts: 35.	Same as Alternative B with Additional Measures but would require less ground disturbance in wetlands and waters. Total acres of wetland impacts: 41.	Same as Alternative B with Additional Measures but would require the second-least amount of ground disturbance in wetlands and waters of the action alternatives. Total acres of wetland impacts: 36.
Wildlife movement (EIS Appendix 15)	Largest ground-disturbance footprint (9,114 acres), most new and improved access roads, and most fencing. Siting corridors would span a greater portion of the relatively undeveloped land in the center of the analysis area. Most development near mapped wildlife linkages. Even with minimization measures, would substantially fragment remaining wildlife habitat and reduce habitat connectivity, and could greatly impair the ability of wildlife to move through the analysis area.	Same as Alternative B except additional measures would reduce impacts to wildlife movement from fencing and access roads.	Same as Alternative B with Additional Measures except reduced ground disturbance (6,953 acres) and fewer miles of temporary fencing and new and improved access roads. Removal of westernmost siting corridors would concentrate development in eastern siting corridors and limit impacts in relatively undeveloped areas. Reduced disturbance near mapped wildlife linkages. Overall, greatly reduced impacts to wildlife movement compared to Alternative B.	Same as Alternative B with Additional Measures except second-most-reduced ground disturbance (4,838 acres) and the second-fewest miles of temporary fencing and new and improved access roads. Eastern siting corridors further reduced, particularly in areas with relatively intact native vegetation, therefore overall, fewest effects on wildlife movement.	Same as Alternative B with Additional Measures except reduced ground disturbance (5,136 acres); similar miles of temporary fencing and new and improved access roads as Alternative D. Removal of more siting corridors in the south and west than Alternative C, but corridors would still occur in the east where native vegetation is relatively intact. Therefore, fewer impacts to wildlife movement than Alternatives B and C, but greater impacts than Alternative D and the Preferred Alternative.	Same as Alternative B with Additional Measures except most-reduced ground disturbance (4,492 acres) and the fewest miles of temporary fencing and new and improved access roads. Removal of more siting corridors in the south and west than Alternative C, but corridors would still occur in the east where native vegetation is relatively intact. Therefore, second-fewest impacts to wildlife movement.

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Big game habitats and populations (main EIS)	Largest ground disturbance (9,114 acres) and construction noise footprint, most new and improved access roads (633 miles), and most fencing (395 miles). Greatest loss or alteration of seasonal habitat for mule deer and pronghorn, most barriers to movement, greatest disturbance and displacement from noise and human activity, and greatest injury and direct mortality from collisions with vehicles.	Same as Alternative B except measures would further reduce impacts to habitat quality and disturbance of mule deer and pronghorn on their winter range. Reduced potential for substantial population-level effects.	Same as Alternative B with Additional Measures except fourth-least habitat loss and alteration (6,953 acres) and reduced displacement from construction noise in seasonal habitat for pronghorn and mule deer because smaller ground-disturbance footprint. Reduced barriers to movement and reduced injury and mortality from vehicle collisions because fewer new and improved access roads (477 miles) and less fencing (303 miles).	Same as Alternative C except second-least habitat loss and alteration (4,838 acres) and least displacement from construction noise in seasonal habitat for pronghorn and mule deer because smallest ground-disturbance footprint. Fewest barriers to movement and least injury and mortality from vehicle collisions because fewest new and improved access roads (353 miles) and least fencing (222 miles).	Same as Alternative C except third-least habitat loss and alteration (5,136 acres) and reduced displacement from construction noise in seasonal habitat for pronghorn and mule deer because second-smallest ground-disturbance footprint. Reduced barriers to movement and reduced injury and mortality from vehicle collisions because second-fewest new and improved access roads (373 miles) and second-least fencing (257 miles).	Same as Alternative C except least habitat loss and alteration (4,492 acres) and reduced displacement from construction noise in seasonal habitat for pronghorn and mule deer because smallest ground-disturbance footprint. Reduced barriers to movement and reduced injury and mortality from vehicle collisions because fewest new and improved access roads (310 miles) and least fencing (200 miles).
Amphibians (EIS Appendix 15)	Greatest loss or alteration of potential amphibian breeding habitat from ground disturbance (1,139 acres) and therefore greatest potential associated effects from disturbance, displacement, and direct injury or mortality. Disturbance within 100 feet of wetlands, streams, and riparian areas avoided or site-specific mitigation plans implemented where disturbance cannot be avoided. Individual amphibians and their breeding habitat could be affected but unlikely to cause or contribute to a loss of population viability or, for special-status amphibians, a trend toward listing under the ESA.	Same as Alternative B but additional preconstruction clearance surveys and measures to minimize impacts in wetlands and drainages would ensure that occupied amphibian breeding habitat is avoided or that impacts are mitigated where avoidance is not possible. Thus, reduced effects on amphibians and their breeding habitat.	Same as Alternative B with Additional Measures except reduced loss or alteration of potential amphibian breeding habitat from ground disturbance (950 acres). Corresponding decrease in associated effects from disturbance, displacement, and direct injury or mortality.	Same as Alternative B with Additional Measures except reduced loss or alteration of potential amphibian breeding habitat from ground disturbance (648 acres). Corresponding decrease in associated effects from disturbance, displacement, and direct injury or mortality. Overall, second-fewest effects on amphibians and their breeding habitat.	Same as Alternative B with Additional Measures except reduced loss or alteration of potential amphibian breeding habitat from ground disturbance (687 acres). Corresponding decrease in associated effects from disturbance, displacement, and direct injury or mortality.	Same as Alternative B with Additional Measures except least loss or alteration of potential amphibian breeding habitat from ground disturbance (608 acres). Corresponding decrease in associated effects from disturbance, displacement, and direct injury or mortality. Overall, fewest effects on amphibians and their breeding habitat.
Pygmy rabbit (EIS Appendix 15)	Greatest pygmy rabbit habitat loss or alteration (1,904 acres) and most impacts to pygmy rabbits from increased barriers to movement, disturbance, displacement, and direct injury or mortality. Pygmy rabbits not observed during project baseline surveys. Occupied habitat identified in preconstruction clearance surveys (if any) would be avoided or individuals would be relocated. Pygmy rabbits unlikely to be affected, but their habitat would be reduced. Effects unlikely to cause or contribute to a trend toward listing under the ESA.	Same as Alternative B except the BLM would require clearance surveys for maintenance and decommissioning activities, as appropriate. Access roads would also be monitored for wildlife carcasses, and adaptive management would be implemented to reduce impacts in areas with high incidences of vehicle strikes. Traffic volume would be higher due to the extended construction phase. Additional measures would further minimize potential impacts to pygmy rabbits.	Same as Alternative B with Additional Measures except ground disturbance in pygmy rabbit habitat (1,556 acres) would be reduced by 17%. Reduced road construction and improvement in pygmy rabbit habitat and slightly lower traffic volume. Thus, reduced potential effects from increased barriers to movement, disturbance, displacement, and direct injury or mortality.	Same as Alternative B with Additional Measures except eastern siting corridors with high sagebrush cover removed. Thus, 47% reduced ground disturbance in pygmy rabbit habitat (990 acres). Least road construction or improvement in pygmy rabbit habitat and lowest traffic volume. Thus, least effects from increased barriers to movement, disturbance, displacement, and direct injury or mortality. Overall, fewest effects on pygmy rabbits and their habitat.	Same as Alternative C except additional southern and western siting corridors removed. Eastern siting corridors with relatively high sagebrush cover not removed. Reduced (by 26% in comparison to Alternative B) ground disturbance in pygmy rabbit habitat (1,384 acres). Reduced road construction and improvement in pygmy rabbit habitat and lower traffic volume. Thus, reduced potential effects from increased barriers to movement, disturbance, displacement, and direct injury or mortality.	Same as Alternative C except slightly greater reduction (28%) in ground disturbance in pygmy rabbit habitat (1,371 acres). Second-least road construction or improvement in pygmy rabbit habitat and second-lowest traffic volume. Thus second-fewest effects from increased barriers to movement, disturbance, displacement, and direct injury or mortality. Overall, second-fewest effects on pygmy rabbits and their habitat.
Minidoka NHS interpretive purpose (main EIS)	Alternative B impacts would alter and diminish the Minidoka NHS visitor experience and NPS interpretive purpose. The disruption and noise introduced into the cultural landscape, viewshed, and soundscape would result in impacts to the four Minidoka interpretive themes: the story of the relocation, living conditions, the work performed, contributions to the military. Alternative B has the highest maximum scenario potential for the number of turbines on the horizon using a GIS terrain analysis. The nearest turbine corridor would be 0.6 mile from the currently undeveloped portion of the Minidoka NHS property and 1.1 miles	Same as Alternative B except additional avoidance and minimization measures slightly reduce visual contrast on the landscape and reduce shadow flicker effects to Minidoka NHS properties.	Same as Alternative B with Additional Measures except Alternative C reduces the amount of turbine corridors in the original Minidoka WRC that would be nearest to and in the most prominent viewing directions of Minidoka NHS. For Alternative C, the nearest turbine siting corridor would be 5.3 miles from the currently undeveloped portion of the Minidoka NHS property and 5.4 miles from the developed Minidoka NHS property. When viewing the project from the Minidoka NHS KOPs, the nearest turbine within the single-frame simulations based on viewer orientation would be 5.5 miles from the Visitor Center (KOP 1), 6.5 miles from the	Same as Alternative C except Alternative D would reduce the maximum number of turbines on the horizon as viewed from the Minidoka NHS KOPs. When viewing the project from the Minidoka NHS KOPs, the distance to the nearest turbines within the single-frame simulations based on viewer orientation would be the same as Alternative C. For Alternative D, the nearest turbine siting corridor would be 5.3 miles from the currently undeveloped portion of the Minidoka NHS property and 5.4 miles from the developed Minidoka NHS property. Under Alternative D, the cultural landscape would appear severely altered	Compared to Alternatives B, C, and D, Alternative E would reduce the potential for visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC and resulting effects on the Minidoka NHS visitor experience and NPS interpretive purpose. For Alternative E, the nearest turbine siting corridor would be 7.7 miles from the currently undeveloped portion of the Minidoka NHS property and 8.1 miles from the developed Minidoka NHS property. When viewing the project from the Minidoka NHS KOPs, the nearest turbine within the single-frame simulations based on viewer orientation would be 8.5 miles from the Visitor	Same as Alternative E except the Preferred Alternative has the smallest siting corridor footprint of all action alternatives and eliminates all but one string of turbines from the immediate foreground and foreground of Minidoka NHS. For the Preferred Alternative, the nearest turbine siting corridor would be 8.5 miles from the currently undeveloped portion of the Minidoka NHS property and 8.8 miles from the developed Minidoka NHS property. When viewing the project from the Minidoka NHS KOPs, the nearest turbine within the single-frame simulations based on viewer orientation would be 8.9 miles from the Visitor

Resource/Issue	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
	from the developed Minidoka NHS property, resulting in potential shadow flicker at these properties. Depending on viewer orientation, the nearest turbine within the single-frame simulations would be 1.7 miles from the Visitor Center (KOP 1), 5.0 miles from the restored Block 22 Barracks (KOP 2), and 5.5 miles from the Honor Roll (KOP 16). The four themes of site significance (civil and constitutional rights, people, place, and WWII) would still be conveyed at Minidoka NHS, but their meaning would be diminished in a landscape with the addition of wind turbines. The change in the environmental setting and feeling from Alternative B would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Project impacts would result in a major degree of change to landscape character and scenic quality and that change would impact the Minidoka NHS interpretive purpose.		restored Block 22 Barracks (KOP 2), and 6.2 miles from the Honor Roll (KOP 16). Compared to Alternative B, Alternative C would have a 100% reduction in potential shadow flicker impacts to the currently undeveloped NPS property and auditory impacts at Minidoka NHS. Alternative C would reduce the maximum number of turbines on the horizon compared to Alternative B. Under Alternative C, the cultural landscape would appear severely altered because of the dominance of the wind turbines on the horizon. The environmental setting would be adversely affected by changes to the visual character of the analysis area, which in turn would alter and diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Project impacts would result in a major degree of change to landscape character and scenic quality and that change would impact the Minidoka NHS interpretive purpose.	because of the dominance of the wind turbines on the horizon. The environmental setting would be adversely affected by changes to the visual character of the analysis area, which in turn would alter and diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Center (KOP 1), 10.1 miles from the restored Block 22 Barracks (KOP 2), and 8.8 miles from the Honor Roll (KOP 16). Compared to Alternative B, the degree of visual changes for viewers at Minidoka NHS would be reduced from major to moderate from the Visitor Center (KOP 1) and the Honor Roll (KOP 16) and reduced from major to minor from the restored Block 22 Barracks (KOP 2). Compared to Alternative B, the degree of visual changes and potential for noise and traffic effects would be further reduced due to the elimination of any turbine siting corridors or haul routes from the original Minidoka WRC. The reduction in turbines on the horizon using a GIS terrain analysis is approximately 40% less under Alternative E when compared to Alternative B. Under Alternative E, the four themes of site significance (civil and constitutional rights, people, place, and WWII) would still be conveyed at Minidoka NHS, but their meaning would potentially be diminished in a landscape with the addition of wind turbines. The change in the environmental setting and feeling from Alternative E would potentially alter and diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to the Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.	Center (KOP 1), 8.8 miles from the restored Block 22 Barracks (KOP 2), and 9.2 miles from the Honor Roll (KOP 16). Compared to Alternative B, the degree of visual changes for viewers at Minidoka NHS would be reduced from major to moderate from the Visitor Center (KOP 1) and Honor Roll (KOP 16) and reduced from major to minor from the restored Block 22 Barracks (KOP 2). Compared to Alternative B, the degree of visual changes and potential for noise and traffic effects would be further reduced due to the elimination of turbine siting corridors, access roads, or other ancillary facilities in the original Minidoka WRC associated with the existing Minidoka NHS. The reduction in turbines on the horizon using a GIS terrain analysis is approximately 50% less under the Preferred Alternative when compared to Alternative B. Under the Preferred Alternative, the four themes of site significance (civil and constitutional rights, people, place, and WWII) would still be conveyed at Minidoka NHS, but their meaning would potentially be diminished in a landscape with the addition of wind turbines. The change in the environmental setting and feeling from the Preferred Alternative would potentially alter and diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to the Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.

* Project infrastructure is not meant to serve as a fuel break. Effective fuel breaks are designed to impede the spread of wildfire or modify fire behavior by taking landscape and fuel characteristics into account. Project infrastructure may not function as an effective fuel break in all circumstances.

† Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

‡ Not all range improvements are compatible with fire suppression activities. For example, although there may be increased water sources, cattle fencing and associated structures may impede ground and aerial access to the stored water.

Table ES-3. Crosswalk of Visual Impact Outcomes for Visual Resources, Cultural Resources, Japanese American and Minidoka-connected Environmental Justice Communities, and Minidoka NHS Interpretive Purpose

Resource/Issue (EIS Section)	Alternative B (Proposed Action)	Alternative B (Proposed Action) with Additional Measures	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Degree of Visual Change (Section 3.16.1)	KOP 1: Major KOP 2: Major KOP 16: Major	KOP 1: Major KOP 2: Major KOP 16: Major	KOP 1: Moderate KOP 2: Major KOP 16: Major	KOP 1: Moderate KOP 2: Major KOP 16: Major	KOP 1: Moderate KOP 2: Minor KOP 16: Moderate	KOP 1: Moderate KOP 2: Minor KOP 16: Moderate
Cultural Resources (Section 3.5.5)	Adverse visual and auditory impacts to Minidoka NHS because turbines would be sited within 1.1 miles of the NHS. Adverse visual and auditory impacts to the setting of Minidoka WRC because turbine siting corridors would occur in the northwest and east portions of Minidoka WRC (see Figure ES-2). Operational noise would be audible within 388 acres of Minidoka NHS and 26,357 acres of Minidoka WRC. Proposed turbines would dominate the landscape in the immediate foreground of Minidoka NHS, with the nearest siting corridor 1.7 miles away. At KOP 1, turbines would be visible across the full field of human vision (in a 135 degree arc) when focused northeastward, spanning a maximum distance of approximately 24 miles across the horizon, beginning with the nearest turbine siting corridor at a distance of 1.7 miles.	Same as Alternative B. Operational noise and visual impacts would be minimized to the extent practicable, such as through increasing setbacks for final turbine positioning. Adverse auditory and visual impacts to Minidoka NHS and Minidoka WRC would still occur.	Adverse visual impacts to Minidoka NHS because turbines would be sited within 10 miles of the NHS, with the nearest turbine corridors 5.4 miles away. The project borders the northeast and east borders of the Minidoka WRC setting and would result in adverse visual and auditory impacts to Minidoka WRC (see Figure ES-2). Operational noise would not be audible at Minidoka NHS but would be audible within 9,102 acres of Minidoka WRC (65% less than Alternative B). Turbines would be visible in a smaller portion of the field of vision (in a 70 degree arc) focused to the northeast of KOP 1 and spanning a smaller 10-mile portion of the horizon. At KOP 1, as distances to the nearest turbine siting corridor increase to 5.5 miles under Alternative C, the nearest potential turbine would appear 70% smaller compared to Alternative B.	Similar to Alternative C, adverse visual impacts to Minidoka NHS because turbines would be sited within 10 miles of the NHS, with the nearest turbine corridors 5.4 miles away The project extends within the east-southeast portion of the Minidoka WRC setting and would result in adverse visual and auditory impacts to Minidoka WRC (see Figure ES-2). Operational noise would not be audible at Minidoka NHS but would be audible within 11,441 acres of Minidoka WRC (57% less than Alternative B, and 26% more than Alternative C). Alternative D turbines would be visible in a slightly greater range of vision (in an 83 degree arc) than Alternative C, to the northeast of KOP 1 and across approximately 13 miles of the horizon. At KOP 1, as distances to the nearest turbine siting corridor increase to 5.5 miles under Alternatives C and D, the nearest potential turbine would appear 70% smaller in size under Alternatives D and C compared to Alternative B.	Adverse visual impacts to Minidoka NHS because turbines would be sited within 10 miles of the NHS. However, because the turbine siting corridors would be set back from Minidoka WRC by a minimum of 3 miles to the northeast, adverse visual impacts would be reduced compared to Alternatives B, C, and D (see Figure ES-2). Operational noise would not be audible at Minidoka NHS or at Minidoka WRC. Alternative E turbines would be visible in a lesser range of vision (in a 60 degree arc) to the northeast of KOP 1 due to greater setback distance although spanning a greater 15 miles of the horizon. At KOP 1, as distances to the nearest turbine siting corridor increase to 8.5 miles under Alternative E, the nearest potential turbine would appear 80% smaller in size compared to Alternative B and 35% smaller compared to Alternatives C and D.	Adverse visual impacts to Minidoka NHS because turbines would be sited within 10 miles of the NHS. However, because the turbine siting corridors would be set back from Minidoka WRC by a minimum of 4 miles to the east, adverse visual impacts would be reduced compared to Alternatives B, C, and D (see Figure ES-2). Operational noise would not be audible at Minidoka NHS or at Minidoka WRC. Preferred Alternative turbines would be visible in the smallest range of vision (in a 55 degree arc) to the northeast of KOP 1 and across up to 12 miles of the horizon. At KOP 1, as distances to the nearest turbine siting corridor increase to 8.8 miles under the Preferred Alternative, the nearest turbine would appear 81% smaller in size compared to the same turbine under Alternative B, 37% smaller compared to Alternatives C and D, and 3% smaller compared to Alternative E.
Japanese American and Minidoka-connected Communities (Section 3.6.1)	Visual impacts under Alternative B would be the greatest of all action alternatives and would result in disproportionately high and adverse effects.	Same as Alternative B (Proposed Action)	Visual impacts under both Alternatives C and D would be lower than Alternative B, but higher than Alternative E and the Preferred Alternative. Disproportionately high and adverse impacts would still occur.	Visual impacts under both Alternatives C and D would be lower than Alternative B but higher than Alternative E and Preferred Alternative. Disproportionately high and adverse impacts would still occur.	Visual impacts under both Alternative E and Preferred Alternative would be lowest of all action alternatives but would not be avoided altogether; therefore, disproportionately high and adverse impacts would still occur.	Visual impacts under both Alternative E and Preferred Alternative would be lowest of all action alternatives but would not be avoided altogether; therefore, disproportionately high and adverse impacts would still occur.
Minidoka NHS Interpretive Purpose (Section 3.19)	Addition of turbines to the viewshed would strongly attract attention and dominate views from Minidoka NHS because of turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Same as Alternative B (Proposed Action)	Addition of turbines to the viewshed would strongly attract attention and dominate views from Minidoka NHS because of turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Addition of turbines to the viewshed would strongly attract attention and dominate views from Minidoka NHS because of turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Addition of turbines to the viewshed would be plainly visible but would not strongly attract attention, nor dominate views, from Minidoka NHS because of turbines' apparent size. This level of visual change would potentially alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.	Addition of turbines to the viewshed would be plainly visible but would not strongly attract attention, nor dominate views, from Minidoka NHS because of turbines' apparent size. This level of visual change would potentially alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impact to Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.

CONTENTS

Appendices

[1] The entirety of the plan of development and all its appendices are provided as Appendix 1 of the EIS. The plan of development is referred to as MVE (2023) throughout the EIS.

Figures

Tables

ABBREVIATIONS

μg/m^3	microgram per cubic meter
μg/L	microgram per liter
°C	degrees Celsius
AADT	annual average daily traffic
AANHPI	Asian American Native Hawaiian Pacific Islander
ACEC	areas of critical environmental concern
ACHP	Advisory Council on Historic Preservation
ADLS	aircraft detection lighting system
AGFD	Arizona Game and Fish Department
AIM	Assessment, Inventory, and Monitoring
AIRFA	American Indian Religious Freedom Act
amsl	above mean sea level
APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
AQRV	air quality–related value
AR5	Intergovernmental Panel on Climate Change’s Fifth Assessment Report
AR6	Intergovernmental Panel on Climate Change’s Sixth Assessment Report
ARPA	Archaeological Resources Protection Act
AUM	animal unit month
AWWI	American Wind Wildlife Institute
BBCS	Bird and Bat Conservation Strategy
BCC	birds of conservation concern
BCI	Bat Conservation International
BCR	bird conservation region
BESS	battery energy storage systems
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent

COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRMO	Craters of the Moon National Monument and Preserve
DAU	data analysis unit
dB	decibels
dBA	A-weighted decibels
DOA	U.S. Department of Agriculture
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
EIS	environmental impact statement
EMU	eagle management unit
EO	executive order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESPA	Eastern Snake River Plain Aquifer
ESR	emergency stabilization and burned area rehabilitation
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FLM	Federal Land Managers
FLPMA	Federal Land Policy and Management Act
GHG	greenhouse gas
GIS	geographic information systems
GMU	game management unit
GS2	grass-shrub
GW	gigawatts
GWP	global warming potential
GWh	gigawatt-hour
HAF	habitat assessment framework
HAP	hazardous air pollutants
HMA	habitat management area
HQT	habitat quantification tool
HPMP	historic properties management plan
HPTP	historic properties treatment plan
I-84	Interstate 84
IAP	instrument approach procedure
IBA	Important Bird Areas
ID 24	Idaho Highway 24 (also known as Kimama Highway)

IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
IFR	instrument flight rules
IFTDSS	Interagency Fuel Treatment Decision Support System
IMC	instrument meteorological conditions
IMPROVE	Interagency Monitoring of Protected Visual Environments
IPOW	integrated program of work
IPCC	Intergovernmental Panel on Climate Change
ITD	Idaho Transportation Department
IWG	Interagency Working Group on Social Cost of Greenhouse Gases
JSO	Joint Secretarial Order
km	kilometer
KOP	key observation point
LADU	local area density unit
LAP	local area population
Leq	equivalent noise level
LOS	level of service
m	meter
mag. $arcsec^{-2}$	magnitudes per square arcsecond
MBTA	Migratory Bird Treaty Act
met	meteorological (e.g., *met tower*)
mg/L	milligrams per liter
MHz	megahertz
Minidoka NHS	Minidoka National Historic Site
Minidoka WRC	Minidoka War Relocation Center
MLRA	Major Land Resource Area
MOU	memorandum of understanding
MOVES3	Motor Vehicle Emissions Simulator
mph	miles per hour
MVE	Magic Valley Energy, LLC
MW	megawatt
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standard
NABat	USGS North American bat dataset
NAGPRA	Native American Graves Protection and Repatriation Act
NAWQA	National Water-Quality Assessment

NEPA	National Environmental Policy Act
NH_3	ammonia
NHPA	National Historic Preservation Act
NLCD	National Landcover Data
NOI	notice of intent
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NPIAS	National Plan of Integrated Airport System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSA	noise-sensitive area
O_3	ozone
OHV	off-highway vehicle
OSC	Idaho Governor's Office of Species Conservation
PA	programmatic agreement
Pb	lead
PFYC	Potential Fossil Yield Classification
$PM_{2.5}$	particulate matter smaller than 2.5 microns in aerodynamic diameter
PM_{10}	particulate matter smaller than 10 microns in aerodynamic diameter
POD	plan of development
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
RCP	representative concentration pathway
RDF	required design feature
ROD	record of decision
ROW	right-of-way
RSC	recreational setting characteristic
RSH	rotor-swept height
SC-GHG	Social Cost of Greenhouse Gas
SF_6	sulfur hexafluoride
SFO	Shoshone Field Office
SGCN	species of greatest conservation need
SHPO	State Historic Preservation Office

SO_2	sulfur dioxide
SQRU	scenic quality rating units
SRMA	special recreation management area
SUA	seasonal use area
SWCA	SWCA Environmental Consultants
SWIP	Southwest Intertie Project
TAC	technical advisory committee
TCP	traditional cultural properties
Tribes	Native American Tribes
TWh	terawatt hours
U.S. 93	U.S. Highway 93
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VCR	visual contrast rating
USNRC	U.S. Nuclear Regulatory Commission
VFR	visual flight rules
VOC	volatile organic compounds
VRI	visual resource inventory
VRM	visual resource management
WEC	West-wide Energy Corridor
WEST	Western EcoSystems Technology, Inc.
WIRS	wildlife incident reporting system
WNS	white nose syndrome
WWII	World War II
WEAP	Worker Education Awareness Program

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CHAPTER 1. INTRODUCTION

1.1 SUMMARY OF PROPOSED PROJECT

Magic Valley Energy, LLC (MVE), has applied for a right-of-way (ROW) grant to construct, operate and maintain, and decommission the Lava Ridge Wind Project (the project), a wind energy facility and ancillary facilities primarily on Bureau of Land Management (BLM) public lands in Jerome, Lincoln, and Minidoka Counties, Idaho (Figure 1.3-1). The project would be located approximately 25 miles northeast of Twin Falls, Idaho, in the area managed by the BLM Shoshone Field Office (SFO). The project would consist of up to 400 wind turbines and associated infrastructure and a 500-kilovolt (kV) generation intertie transmission line that would interconnect at Idaho Power's existing Midpoint Substation or at a new substation along the permitted Southwest Intertie Project (SWIP) northern portion (SWIP-North) 500-kV transmission line. MVE submitted their application and a preliminary plan of development (POD) in February 2020. Through coordination with the BLM and cooperating agencies, MVE revised their POD and resubmitted it to the BLM in December 2023 (MVE 2023) (environmental impact statement [EIS] Appendix 1).[2]

The BLM SFO is responsible for managing land in accordance with the Federal Land Policy and Management Act (FLPMA) (1976) and in conformance with the BLM SFO's 1986 *Monument Resource Management Plan*, as amended (BLM 1986); see also EIS Appendix 2 (Potential Major Agency Authorities and Actions and Other Applicable Federal Laws, Regulations, and Policies). FLPMA requires that public lands be managed for multiple uses in a manner that uses the lands in a combination that would best meet the present and future needs of the people. The BLM is authorized to grant a ROW for facilities that are in the public interest and that require a ROW over, upon, under, or through such lands (FLPMA Section 501(a)(7)). This EIS, prepared under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] Section 4321, et seq.), analyzes and discloses the potential environmental impacts of MVE's proposed project and alternatives for BLM decision making.

The organization of the final EIS is revised from that of the draft EIS to focus on resources and issues that would be significantly affected by the action alternatives. The resources and issues that were analyzed in detail in the draft EIS, which the BLM concluded were either not significant or could be mitigated to less than significant, were moved to EIS Appendix 15. In EIS Appendix 15, the BLM provides the full analysis of the resources and issues that the BLM concluded were not significantly impacted. This was done for two reasons. First, this approach is consistent with NEPA's direction to focus an EIS on significant environmental issues.[3] Second, the revised organization complies with the recently enacted amendments to NEPA via the Fiscal Responsibility Act of 2023, which limits an extraordinarily complex EIS to 300 pages[4], not including any citations or appendices (42 USC 4336a(e)(1)(A)-(B)). The BLM determined that because of the size, scope, and scale of the proposed agency action, this EIS is extraordinarily complex.

Table 1.4-1 in Section 1.4 lists the issues that were identified for analysis in the draft EIS, and where the analyses may be found in the final EIS or EIS Appendix 15.

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[2] The entirety of the POD and all its appendices are provided as Appendix 1 of the EIS. The POD is referred to as MVE (2023) throughout the EIS.

[3] 40 CFR 1502.1 states an EIS "shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data."

[4] A *page* is defined as "500 words and does not include citations, explanatory maps, diagrams, graphs, tables, and other means of graphically displaying quantitative or geospatial information" 40 CFR 1508.1(bb).

1.2 PURPOSE AND NEED

The BLM's purpose is to respond to MVE's application for a ROW to construct, operate and maintain, and decommission a wind energy facility on public lands in compliance with FLPMA, BLM ROW regulations, and other applicable federal laws and policies (detailed in EIS Appendix 2). The need for this action arises from FLPMA, which requires the BLM to manage public lands for multiple use and sustained yield and authorizes the BLM to issue ROWs on public lands for systems for generation, transmission, and distribution of electric energy (FLPMA Title V). The BLM will review the Proposed Action and other alternatives and decide whether to approve, approve with modifications, or deny MVE's application, and may include any terms, conditions, and stipulations it determines to be in the public interest.

In making this decision, the BLM may consider MVE's goal to generate renewable energy with wind turbines for delivery to power markets in the western United States, including those markets accessed via interconnection to the existing Midpoint Substation or to an alternative new substation constructed along the permitted, but not-yet-constructed, SWIP-North. The BLM will also consider a number of federal regulations and policies, including the following:

- The policy expressed in 43 USC 3004(b) to "seek to issue permits that, in total, authorize production of not less than 25 gigawatts of electricity from wind, solar, and geothermal energy projects by not later than 2025, through management of public lands and administration of Federal laws."
- The policy expressed in Executive Order (EO) 14008 (Tackling the Climate Crisis at Home and Abroad) to "increase renewable energy production on [public] lands."
- The requirements of EO 12898 to "make achieving environmental justice part of [the BLM's] mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."
- The requirements of 512 Departmental Manual 4 to "consult with tribes on a government-to-government basis whenever DOI [U.S. Department of the Interior] plans or actions have tribal implications."

1.3 DECISION TO BE MADE

The BLM must review all components of the project that involve the use of public lands. This EIS provides the information and environmental analysis necessary to inform the BLM's Authorized Officer and the public about the potential environmental impacts from the project.

The BLM decision to be made will include

- whether to grant, grant with modification, or deny a ROW to construct, operate and maintain, and decommission the proposed wind energy facility on public lands;
- the most appropriate location for the project on public lands; and
- the terms and conditions (stipulations) for the construction, operation and maintenance, and decommissioning of the wind energy facility on public lands that should be applied to the ROW.

The BLM has prepared this EIS to disclose and analyze the potential direct, indirect, and cumulative impacts of the Proposed Action and alternatives, as required by the NEPA; to facilitate public participation; and to assist the BLM Authorized Officer in making the decision as described above.

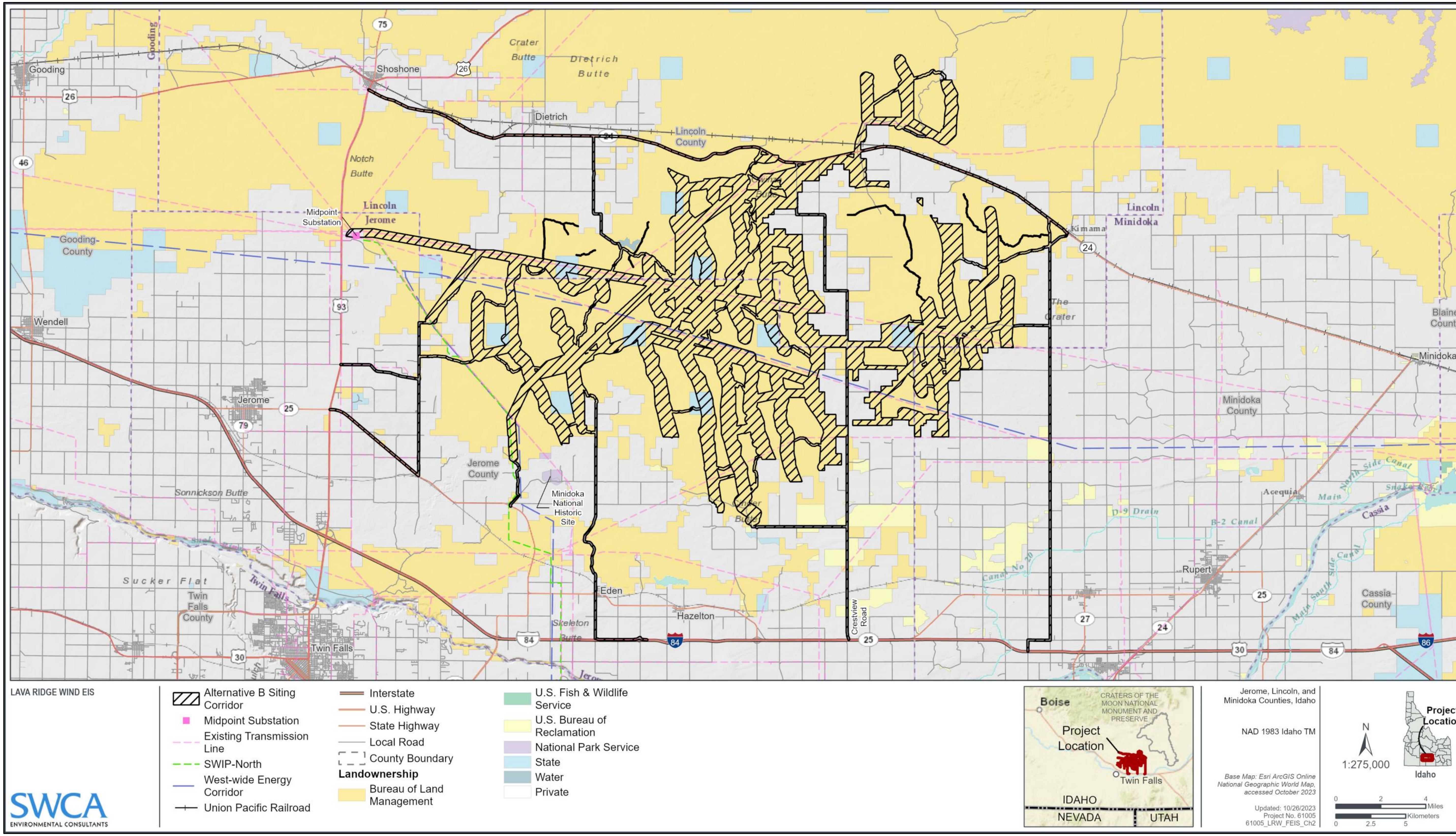

Figure 1.3-1. Alternative B (Proposed Action) siting corridors.

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1.4 PRELIMINARY ISSUES IDENTIFICATION

Comments received during scoping were categorized as issues associated with resource topics, issues associated with BLM policy (and therefore not addressed in this EIS), or out-of-scope comments (see EIS Appendix 10 for additional details regarding this process). Substantive issues within the scope of this EIS that were identified through internal and external scoping and used to develop alternatives are addressed in EIS Chapter 3, Affected Environment and Impacts, and are summarized in Table 1.4-1. These issues include potential impacts to avian and bat species and to cultural, wildlife, and visual resources. Substantive issues were identified as those that could have significant effects to resources in the area; are necessary to make a reasoned choice among alternatives; or are needed to address points of disagreement, debate, or dispute regarding an anticipated impact from the project. As described in Section 1.1, additional resources and issues that were analyzed in detail that the BLM concluded were not significantly impacted may be found in EIS Appendix 15.

Issues that were identified but did not warrant further detailed analysis include issues where the resource in question is not present in the analysis area, where applicant-committed measures or other mitigation would reduce impacts below significance, or where the impact context is so low that a detailed analysis was not needed to determine significance. Further, issues analyzed in other NEPA documents and tiered to in the Lava Ridge Wind Project EIS or issues that required an initial analysis to determine the potential significance of impacts were analyzed in brief. Issues analyzed in brief and their rationale are detailed in EIS Appendix 3. Some issues analyzed in brief may be affected by the project, but effects would be relatively minor in comparison with the issues analyzed in detail. In compliance with 40 CFR 1502.2(b), this EIS has "only brief discussion of other than significant issues."

Table 1.4-1. Issues Analyzed in Detail

Resource	Final EIS Location	Issues Analyzed in Detail
Air quality Construction air quality and air quality–related values	Section 3.2.1 in EIS Appendix 15	How would criteria pollutants, hazardous air pollutants (HAPs), and fugitive dust created during construction, decommissioning, and reclamation affect air quality, including air quality-related values (AQRVs) at Class I areas or non-attainment areas?
Air quality Operation air quality and air quality–related values	Section 3.2.2 in EIS Appendix 15	How would criteria pollutants, HAPs, and fugitive dust created during construction, decommissioning, and reclamation affect air quality, including AQRVs at Class I areas or non-attainment areas?
Avian and bat species Bat populations and roosting habitat	EIS Section 3.3.1	How would turbine operation affect bat populations? How would the project affect bat roosting habitat?
Avian and bat species Avian populations	EIS Section 3.3.2	How would turbine operation and meteorological towers affect avian populations?
Avian and bat species Eagles	EIS Section 3.3.3	How would the project affect nesting and wintering eagles? How would the project affect populations of eagles?
Avian and bat species Greater Sage-grouse	EIS Section 3.3.4	How would the project affect sage-grouse (*Centrocercus urophasianus*) habitat? How would project noise and human activity affect sage-grouse? How would the project affect how sage-grouse use habitat or how they move among habitats?

Resource	Final EIS Location	Issues Analyzed in Detail
Climate and greenhouse gases Construction greenhouse gas emissions	Section 3.4.1 in EIS Appendix 15	What quantity of GHG emissions would be emitted from construction and decommissioning of the project, and how do GHG emissions contribute to climate change?
Climate and greenhouse gases Operation greenhouse gas emissions	Section 3.4.2 in EIS Appendix 15	What quantity of GHG emissions would be emitted from operation of the project, and how do GHG emissions contribute to climate change?
Cultural Resources Physical impacts	EIS Section 3.5.4	How would ground disturbance from the project physically impact cultural resources?
Cultural Resources Non-physical impacts	EIS Section 3.5.5	How would the installation of new aboveground infrastructure cause non-physical impacts to cultural resources (i.e., with visual or auditory effects)?
Environmental justice and socioeconomics Environmental Justice Communities	EIS Section 3.6.1	How would the project affect environmental justice communities, and would these effects be disproportionately adverse?
Environmental justice and socioeconomics Community Services, Employment, and Housing Availability	Section 3.6.2 in EIS Appendix 15	How would project construction and operation affect community services, employment, and housing availability?
Environmental justice and socioeconomics Local and regional economy	Section 3.6.3 in EIS Appendix 15	How would project-related spending directly (wages, spending on materials and equipment) or indirectly (taxes on goods and services) contribute to the local and regional economy during construction and operation?
Environmental justice and socioeconomics Residential property values	Section 3.6.4 in EIS Appendix 15	How would the presence and operation of wind turbines affect residential property values?
Fire and fuels management Wildfire ignition, spread, response, and suppression	Section 3.7.1 in EIS Appendix 15	How would the project affect the risk of human-caused or natural-caused wildfire ignition and spread in the analysis area and wildfire response and suppression efforts?
Fire and fuels management Fuels reduction and habitat restoration projects	Section 3.7.2 in EIS Appendix 15	How would project construction and operation affect the fuels reduction aspect of habitat restoration projects that have been carried out in the area and identified in the BLM's IPOW?
Land use and realty Land use authorizations	Section 3.8.1 in EIS Appendix 15	How would construction and operation of the project affect existing and reasonably foreseeable land use authorizations (i.e., authorized land uses and ROWs, communication sites, or FAA/aviation uses)? Would the project result in the permanent conversion of existing land uses?
Land use and realty Aviation	Section 3.8.2 in EIS Appendix 15	How would construction and operation of the project affect aviation resources, including regional airports, controlled airspace, and aerial crop dusting or other aerial operations?
Livestock grazing Grazing allotments and range socioeconomics	Section 3.9.1 in EIS Appendix 15	How would the project affect areas available for livestock grazing and subsequent forage availability (using animal unit months) in BLM grazing allotments?
Livestock grazing Physiological effects to livestock	Section 3.9.2 in EIS Appendix 15	How would turbine operation, vehicle traffic, and increased human presence from the project physiologically affect livestock?

Resource	Final EIS Location	Issues Analyzed in Detail
Paleontological resources Potential disturbance of unknown fossils	Section 3.10.1 in EIS Appendix 15	How would ground disturbance associated with the project physically affect unknown paleontological resources in areas with mapped Quaternary-age alluvial and lacustrine (or playa) deposits?
Pollinators and insects Pollinators	Section 3.11.1 in EIS Appendix 15	How would the project affect pollinators?
Pollinators and insects St. Anthony sand dune tiger beetle	Section 3.11.2 in EIS Appendix 15	How would the project affect St. Anthony sand dune tiger beetle (*Cicindela arenicola*) habitat and population?
Pollinators and insects Monarch butterfly	Section 3.11.3 in EIS Appendix 15	How would the project affect monarch butterfly habitat and population?
Pollinators and insects BLM special-status bumble bees	Section 3.11.4 in EIS Appendix 15	How would the project affect western bumble bee (*Bombus occidentalis*) and Suckley's cuckoo bumble bee (*Bombus suckleyi*) habitat and populations?
Recreation Hunting and trapping access and opportunities	Section 3.12.1 in EIS Appendix 15	How would the project affect hunting and trapping access and opportunities, and how would changes in hunting and trapping access and opportunities affect the existing BLM-permitted hunting outfitter?
Recreation Off-highway vehicle opportunities and experience	Section 3.12.2 in EIS Appendix 15	How would the project affect OHV opportunities and experiences?
Soils Soil and plant growth materials	Section 3.13.1 in EIS Appendix 15	How would the project impact sensitive soils, soil health, and plant growth material quantity and quality?
Vegetation Native upland vegetation communities	Section 3.15.1 in EIS Appendix 15	How would the project affect native upland vegetation communities?
Vegetation Bureau of Land Management special-status plants	Section 3.15.2 in EIS Appendix 15	Would the project result in population declines of BLM special-status plants?
Visual resources Landscape character and scenic quality	EIS Section 3.16.1	How would the introduction of project components impact sensitive viewing platforms (i.e., KOPs) and the existing landscape character and scenic quality?
Visual resources Night skies	EIS 3.16.2	How would project lighting impact sensitive viewers and night skies at CRMO and at Minidoka National Historic Site (NHS)? How would aircraft warning lighting impact sensitive viewers and night skies during operation?
Visual resources Shadow flicker	Section 3.16.3 in EIS Appendix 15	How would shadow flicker from the introduction of wind turbines impact sensitive receptors within 2 miles of the siting corridors?
Water and wetland resources Groundwater quantity	Section 3.17.1 in EIS Appendix 15	How would groundwater withdrawals needed for the project affect groundwater quantity in the analysis area?
Water and wetland resources Groundwater wells and canals	Section 3.17.2 in EIS Appendix 15	How would the integrity of existing groundwater wells and the Milner-Gooding and Dietrich Main Canals be affected by project blasting?
Water and wetland resources Groundwater quality	Section 3.17.3 in EIS Appendix 15	Would groundwater be contaminated from project blasting and wind turbine generator foundation construction?

Resource	Final EIS Location	Issues Analyzed in Detail
Water and wetland resources Wetlands and surface waters	Section 3.17.4 in EIS Appendix 15	How would project ground disturbance affect wetlands and surface waters (e.g., streams, canals, and ponds) in the analysis area?
Wildlife Wildlife movement (non-game mammals and reptiles)	Section 3.18.1 in EIS Appendix 15	How would the presence of project facilities affect wildlife movement within the siting corridors and between the siting corridors and adjacent habitats?
Wildlife Big game habitats and populations	EIS Section 3.18.2	How would the project affect pronghorn and mule deer habitat and distribution of local (Owinza) populations?
Wildlife Amphibians	Section 3.18.3 in EIS Appendix 15	How would the project affect amphibian breeding habitat and populations?
Wildlife Pygmy rabbit	Section 3.18.4 in EIS Appendix 15	How would the project affect the pygmy rabbit and its habitat?
Minidoka National Historic Site Interpretive Purpose	EIS Section 3.19	How would the impacts identified within the EIS affect the NPS interpretive purpose of Minidoka NHS?

1.5 CHANGES BETWEEN DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENT

In response to public comments and concerns raised during the public comment period for the draft EIS, the BLM made revisions to the EIS, which are summarized here. This final EIS incorporates all design modifications into the EIS analyses and considers public comments and feedback received from cooperating agencies for the draft EIS. Key changes reflected in this final EIS include the following:

- In response to the Consolidated Appropriations Act, 2024 (Public Law No. 118-42, Section 441), the BLM held additional meetings to consult with stakeholders, local elected officials, and state agencies on the project. These meetings were in addition to the meetings held as part of the BLM's planned outreach to facilitate coordination with Native American Tribes, cooperating agencies, and consulting parties. The meetings focused on providing information on the design of action alternatives that would reduce impacts to wildlife, cultural resources, transportation, hunting, wetlands, the connected surface and ground waters, and other resources. The feedback from these meetings was consistent with the information that the BLM had received throughout the NEPA process and is incorporated into the final analysis within the EIS.

  In addition to specific meetings held after the passage of the Consolidated Appropriations Act, 2024, the BLM engaged with stakeholders and local elected officials throughout the evaluation of the project. The BLM recognizes the importance of public involvement in the management of public lands and knows that facilitating opportunities for engagement is fundamental to its mission. From the onset of the project in 2020, the BLM initiated early discussions with stakeholders, commenced consultation with Native American Tribes, coordinated with MVE to hold open houses, and established cooperating agencies and consulting parties. These proactive measures were taken prior to initiating NEPA and were used in preparation for meeting the NEPA requirements.

  Throughout the NEPA process and the preparation of the EIS, the BLM provided multiple opportunities through different channels to engage with cooperating agencies and interested parties. This resulted in coordinating with or receiving feedback from local Native American

Tribes, 12 federal and state agencies, three counties, 119 organizations, and numerous individuals. The BLM also established a Resource Advisory Council subcommittee, which resulted in information sharing and a comprehensive set of comments on multiple issues. All the insights gathered from these engagements were instrumental in shaping the action alternatives and contributed significantly to a well-informed analysis of the potential impacts.

- In response to the amendments to NEPA via the Fiscal Responsibility Act of 2023 (Public Law No. 118-5, Section 321(e)(1)(B), 137 Stat. 10 and 41–42), the BLM revised the organization of the final EIS to comply with the Fiscal Responsibility Act's 300-page limit, i.e., the limit for a proposed agency action determined to be of “extraordinary complexity.” Among other things, the resources and issues analyzed in detail in the draft EIS that the BLM concluded were either not significant or could be mitigated to less than significant were moved to EIS Appendix 15.
- Identification of a Preferred Alternative, presented in EIS Section 2.8. This alternative was identified to reduce visual impacts to Minidoka NHS, reduce disturbance to big game migration routes and winter concentration areas, reduce impacts to Jerome County Airport and agricultural aviation uses, and reduce impacts to non-participating private landowners.
- Because of the mitigation required by BLM policy that would include seasonal construction restrictions, the total duration of construction for all action alternatives, except Alternative B, was extended to up to 3 years.
- Revisions to the Proposed Action, as follows:
    - Water use estimates were updated.
    - The Grazing Plan (Appendix S in Magic Valley Energy, LLC [MVE] [2023]) was updated, including additional details about temporary construction fencing, ongoing animal unit months mitigation coordination with livestock permittees, and how MVE would supply water to rangeland improvements in the project area.
    - Additional applicant-committed measures were added to EIS Appendix 4 (Table App4-2) regarding blasting and reclamation. Existing measures were clarified for fire, range improvements, and reclamation.
- As a result of recent relevant case law, greater sage-grouse (*Centrocercus urophasianus*) analyses were updated to include an additional analysis regarding population connectivity, as well as broader population trends across the sage-grouse range, across the state of Idaho, and at a local and regional level.
- New issue statements were added to the EIS analysis, as follows:
    - Section 3.17.2 in EIS Appendix 15: How would the integrity of existing groundwater wells and the Milner-Gooding and Dietrich Main Canals be affected by project blasting?
    - Section 3.17.3 in EIS Appendix 15: Would groundwater be contaminated from project blasting and wind turbine generator foundation construction?
    - Section 3.19: How would the impacts identified within the draft EIS affect the National Park Service (NPS) interpretive purpose of Minidoka NHS?
    - Section 3.8.2 in EIS Appendix 15: How would construction and operation of the project affect aviation resources, including regional airports, controlled airspace, and aerial crop dusting or other aerial operations?
- An analysis of a potential area of critical environmental concern for Minidoka WRC was added to Section 3.8.1 in EIS Appendix 15 (Land Use Authorizations), and a new appendix (EIS Appendix 13 [Preliminary Evaluations of Potential Areas of Critical Environmental Concern]) was added to the EIS.

- Revisions were made to the visual resource inventory, and project-specific interim visual resource management classes were added to the analysis (see EIS Section 3.16.1 [Landscape Character and Scenic Quality]).
- The mitigation approach was further developed and refined (see EIS Appendix 4, Mitigation), as follows:
    - New measures were added to (or clarified in additional project-specific mitigation for) biological resources, fire and fuels management, transportation, water resources, visual resources, cultural resources, and human health and safety (see Table App4-3 in EIS Appendix 4).
    - Compensatory mitigation frameworks were added for avian and bat species (including greater sage-grouse), for big game, and for Minidoka NHS (see Table App4-4 in EIS Appendix 4).
    - Details were added regarding the project avian and bat postconstruction monitoring plan.
    - Details were added regarding the mitigation variance process to allow for flexible management of specified resources.

CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

This chapter describes MVE's proposal to construct and operate a wind energy facility, the alternatives development process, alternatives carried forward for detailed analysis in this EIS, and alternatives eliminated from detailed analysis. A description of the construction, operation and maintenance, and decommissioning of the Proposed Action and alternatives is provided in this chapter, and more details on the Proposed Action are in MVE (2023).

2.1 ALTERNATIVES DEVELOPMENT PROCESS

Internal and external scoping identified issues to be analyzed in this EIS, and a range of alternatives was developed to address those issues. Council on Environmental Quality (CEQ) guidance regarding alternatives states that *reasonable* alternatives include those that are technically and economically feasible and meet the purpose and need of the project, rather than simply desirable from the standpoint of MVE (CEQ 2022). A range of alternatives was developed and alternatives were carried forward for detailed analysis if they 1) met the BLM's purpose and need, 2) were technically and economically feasible, 3) addressed the substantive issues identified in scoping, 4) reduced potential adverse environmental effects or addressed resource conflicts when compared to the Proposed Action, and 5) were consistent with management objectives outlined in BLM (1986), as amended. Because the Proposed Action siting corridors were developed considering wind resource data and requirements needed to develop a technically feasible project, the alternatives were developed using subsets of the Proposed Action siting corridors, resulting in alternatives that would meet the same technical requirements and also be technically feasible. This approach was needed because the wind resource varies across the project area and the data gathered to support the impacts analysis were focused on areas within or near the Proposed Action siting corridors. All alternatives are described below. Additional rationale for the alternatives not carried forward for detailed analysis is provided in Section 2.9 (BLM Alternatives Considered but Eliminated from Detailed Analysis).

2.2 ALTERNATIVE A (NO ACTION)

Under Alternative A, the BLM would deny MVE's application for construction, operation and maintenance, and decommissioning of the project. The project facilities would not be built, and existing land uses and present activities in the area would continue. The land would continue to be available to other uses that are consistent with BLM (1986) and its amendments, including other potential wind developments. Federal and regional renewable energy goals would have to be met using other alternative energy projects at other locations.

2.3 PROJECT ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

Regardless of the action alternative selected, specific project requirements, constraints, and elements apply to all action alternatives analyzed in detail. These include the project location, construction methods, project components, operation and maintenance activities, and decommissioning activities. Project elements common to all action alternatives are described in EIS Appendix 11.

2.3.1 Project Location, Siting, Landownership, and Jurisdiction

The project would be located on public lands managed by the BLM SFO and on state lands in the Idaho counties of Jerome, Lincoln, and Minidoka (see Figure 1.3-1). Some project access would also occur via existing roads managed by the local highway districts across Bureau of Reclamation (BOR) public lands and private lands. Relative to the surrounding communities, the general area for development would be open rangelands east of Shoshone, north of Eden and Hazelton, and west of Minidoka. Dietrich would be the closest community to the turbines (approximately 6 miles northwest).

All action alternatives would site infrastructure in corridors approximately 0.5 mile wide. Three types of corridors are described based on the type of infrastructure and level of disturbance to which they are associated (see also Figure 2.4-2):

1. Turbine siting corridors are 0.5 mile wide and would include all turbines and associated infrastructure. MVE (2023) identifies these as "combined corridors" because they include turbine siting and all other turbine-related access and infrastructure.
2. Ancillary siting corridors include all other infrastructure that falls outside of the 0.5-mile turbine siting corridor (e.g., construction crane paths, access roads, transmission and collector lines, and buildings). MVE (2023) identifies these as "balance of [generation] plant" corridors.
3. Range improvement corridors include areas where only range improvements would be implemented (fencing, water lines, troughs, etc.) to minimize potential project impacts to grazing operations.

Up to 11% of the siting corridors, regardless of corridor type, would have work area or infrastructure ground disturbance (see Section 2.3.2 [Work Area and Infrastructure Disturbance]). Although the exact location of infrastructure and activities within the siting corridors is unknown at this time, evaluating the entirety of the siting corridors for potential impacts provides flexibility to site the project components where necessary (from both resources and engineering perspectives) within the siting corridors. The project's final design and engineering would be completed after the BLM has issued a record of decision (ROD) and would be informed by applicant-committed measures and other mitigation requirements established in the ROD. The project's final design would identify the specific location for all infrastructure and project activities and would be approved by the BLM Authorized Officer. This EIS identifies and considers effects to resources present within the siting corridors, allowing for identification of areas with fewer impacts or specific resource trade-offs. This identification of resource constraints within the siting corridors provides flexibility for the project design to adjust through site-specific engineering for the final layout. The action alternatives consider different configurations of the siting corridors to avoid or minimize potential effects. These configurations are described by alternative below.

Wind turbine siting corridors would be concentrated in the higher elevation lands associated with several buttes in the area and on mid-elevation lands between the buttes. The prominent buttes on the landscape in the siting corridors are Wilson Butte, Owinza Butte, Sid Butte, and Kimama Butte.

Most project components would be located on BLM public lands. Several State of Idaho–owned parcels are also present in the siting corridors and would provide opportunities to locate additional wind turbines, collector and transmission lines, and potentially other ancillary components. Tracts of privately owned parcels are adjacent to the siting corridors. (Some project access would also occur via existing roads, managed by the local highway districts, across BOR public lands and private lands.)

A siting consideration for alternatives development was the proximity of the project to the Minidoka NHS, a World War II (WWII)–era Japanese American incarceration site in Jerome County. As described further in Section 3.20 (Minidoka War Relocation Center and Minidoka National Historic Site) in EIS Appendix 9, the incarceration site encompasses approximately 388 acres and is managed by the National Park Service (NPS). Minidoka NHS comprises the central portion of the original approximately 34,000-acre Minidoka War Relocation Center (WRC). The area within the Minidoka WRC boundary is now a mixture of federal, state, and private land. Because scoping comments identified the potential for impacts to Minidoka NHS, alternatives were developed to avoid or minimize impacts to the site. Impacts to both Minidoka NHS and Minidoka WRC are described in Section 3.5 (Cultural Resources), Section 3.6 (Environmental Justice and Socioeconomics), and 3.19 (Minidoka NHS Interpretive Purpose).

2.3.2 Work Area and Infrastructure Disturbance

Project ground disturbance is described as work areas disturbance or infrastructure disturbance (see Section 1.3.3 in MVE [2023]). Since these components are discussed throughout this EIS, they are defined here.

2.3.2.1 Work Area Disturbance

Work areas are the land needed to construct, and subsequently decommission, the project. Work areas would have interim reclamation after construction and may not be wholly disturbed during project operation. However, throughout the life of the project, work areas (even if they received interim reclamation) may be re-disturbed to accommodate larger equipment for certain operation and maintenance activities. For example, an intersection may be improved for construction to transport a turbine blade to the turbine pad. After construction, this intersection would be reclaimed down to a reasonable size for most operation activities. However, if a turbine blade needed to be replaced during operation, the reclaimed part of that intersection would be re-disturbed to allow for transport of the blade and crawler crane. Once the blade replacement is complete, the intersection would be reclaimed again. Final reclamation of all work areas would occur following project decommissioning.

2.3.2.2 Infrastructure Disturbance

Land occupied by infrastructure would remain disturbed from the beginning of construction through decommissioning of the wind energy facility. Infrastructure disturbance would include the footprint of the infrastructure and the area immediately adjacent where operation and maintenance activities would occur throughout the life of the project. During operation and maintenance, no interim reclamation would occur within infrastructure disturbance areas. Reclamation would occur after decommissioning once the infrastructure is removed.

2.3.3 Project Phases and Duration

The project is proposed such that the entire development may be constructed in a single continuous period or divided into two or more individual subphases that entail a portion of the overall project. The EIS analysis assumes an approximate project schedule consisting of three phases (Table 2.3-1).

Table 2.3-1. Project Phases and Duration

Phase	Alternative B (years)	Alternatives C–E and the Preferred Alternative (years)
Construction	2	3
Operation and maintenance	30	30
Decommissioning	2	3

Construction and decommissioning for all action alternatives may occur continuously or with gaps of time in between. If construction occurs with gaps of time in between, it could take longer than 2 to 3 years. The EIS uses the term *the life of the project* when referring to the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives (Alternatives C through E and the Preferred Alternative).

Interim reclamation in work areas would occur following construction, and this EIS assumes that interim reclamation would result in successful revegetation of native grasses in 2 to 5 years (though other vegetation would take longer, as described in Section 3.15.1 [Native Upland Vegetation Communities] in EIS Appendix 15). At that time, the BLM would evaluate and would implement further reclamation activities if needed. EIS Appendix 4 details applicant-committed measures and BLM mitigation measures that include project timing stipulations. Final reclamation would occur concurrent with decommissioning and is described in the Final Reclamation section of EIS Appendix 11.

2.3.4 Avoidance and Minimization

Use of public lands for either development or access requires compliance with the stipulations and policy governing those public lands, including BLM (1986), as amended, and relevant federal laws, regulations, and policy. NEPA regulations (40 CFR 1508.1(s)) define *mitigation* as avoiding, minimizing, rectifying, reducing over time, or compensating for impacts of a proposed action (CEQ 2022). MVE (2023) includes numerous applicant-committed measures that are avoidance and minimization and are part of the project design. Additional avoidance and minimization occurred through project siting and design; these are not documented in MVE's applicant-committed measures but are described in MVE (2023). The BLM developed mitigation for the project using the mitigation hierarchy described in the Mitigation Framework section of EIS Appendix 4. All applicant-committed measures and other mitigation measures are detailed in EIS Appendix 4. These measures guide project planning, construction activities, facility development, operation and maintenance, and decommissioning to minimize environmental and operational impacts.

2.4 ALTERNATIVE B (PROPOSED ACTION)

As discussed in Section 1.1 (Summary of Proposed Project), the BLM received a ROW application from MVE to construct, operate and maintain, and decommission a wind energy facility and associated infrastructure. Under Alternative B, the BLM would authorize (with terms and conditions) the wind energy facility as proposed by MVE. Figures 1.3-1 and 2.4-1 show the extent of the siting corridors proposed for development under Alternative B. Table 2.4-1 lists the anticipated project components, quantities, and associated disturbance acreages for Alternative B and the other action alternatives. Table 2.4.2 provides specific traffic details for Alternative B and the other action alternatives, and Table 2.4-3 provides details on roads. Table 2.4.1 provides the maximum number of turbines by turbine size. For example, Alternative B could have up to 400 3-megawatt (MW) turbines or up to 349 6-MW turbines, or a combination of 3-MW and 6-MW turbines not to exceed 400. The maximum height of the turbines would be between 390 and 740 feet, depending on their MW capacity[5]. The ground disturbance described in this EIS is for the largest disturbance footprint, which would be the maximum number of 3-MW turbines. The generation capacity of Alternative B would be nearly 25% more than the largest existing wind facility in the United States; there are only four other existing U.S. wind facilities with capacities of 800 MW or greater (Carlin 2022). However, other larger facilities are under construction (e.g., the Chokecherry and Sierra Madre Wind Energy Project in Wyoming, which would produce approximately 3,000 MW and is scheduled for construction completion in 2026).

As discussed in Section 2.3.3, the project may be divided into two or more subphases that entail a portion of the overall project. MVE would submit a project construction schedule to the BLM for review and

[5] MVE (2023) provides size characteristics for the potential use of 2-MW to 6-MW turbines. The Chapter 3 impacts analyses in this EIS evaluate the potential use of 3-MW to 6-MW turbines.

approval before the construction notice to proceed is granted (measure b in EIS Appendix 4). The construction schedule within the Star Lake grazing allotment would occur in three subphases (North Star Lake, South Star Lake, and West Star Lake; see Appendix S of MVE [2023]) so that construction occurs in approximately one third of the Star Lake grazing allotment at any given time (see Figure 2.4-3). Primary access roads to an active construction subphase area (for example the West Star Lake subphase) would continue to be used through the previously completed subphase areas (for example the North Star Lake subphase) to allow for sufficient access from Idaho Highway 24 (ID 24). Concentrating construction activities in a single subphase area at a time would reduce the potential for conflicts between construction activities and livestock operations, reduce the amount of temporary fence necessary during construction, provide the public better predictability for areas not experiencing construction traffic, and make areas available for wildlife to avoid human noise and activity from construction.

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Table 2.4-1. Project Components by Action Alternative

Project Component	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
General project area	197,474 acres	146,389 acres	110,315 acres	122,444 acres	103,864 acres
Siting corridors	84,051 acres	65,215 acres	48,597 acres	50,680 acres	44,768 acres
Wind turbines	Up to 400 3-MW turbines or up to 349 6-MW turbines	Up to 378 3-MW turbines or up to 259 6-MW turbines	Up to 280 3-MW turbines or up to 179 6-MW turbines	Up to 269 3-MW turbines or up to 194 6-MW turbines	Up to 241 3-MW or 5-MW turbines
Estimated generation capacity*	1,200–2,094 MW	1,134–1,554 MW	840–1,074 MW	807–1,164 MW	723–1,205 MW
Estimated annual generation in terawatt hours (TWh) for the project operating at 35%–45% net capacity factor[§]	3.7–4.7 TWh with all 3-MW turbines 6.4–8.3 TWh with all 6-MW turbines	3.5–4.5 TWh with all 3-MW turbines (5% reduction from Alternative B) 4.8–6.1 TWh with all 6-MW turbines (26% reduction from Alternative B)	2.6–3.3 TWh with all 3-MW turbines (30% reduction from Alternative B) 3.3–4.2 TWh with all 6-MW turbines (49% reduction from Alternative B)	2.5–3.2 TWh with all 3-MW turbines (33% reduction from Alternative B) 3.6–4.6 TWh with all 6-MW turbines (44% reduction from Alternative B)	2.2–2.9 TWh with all 3-MW turbines (38% reduction from Alternative B) 3.7–4.8 TWh with all 5-MW turbines (42% reduction from Alternative B)
Project duration	34 years total: 2 years construction 30 years operation 2 years decommissioning	36 years total: 3 years construction 30 years operation 3 years decommissioning	36 years total: 3 years construction 30 years operation 3 years decommissioning	36 years total: 3 years construction 30 years operation 3 years decommissioning	36 years total: 3 years construction 30 years operation 3 years decommissioning
Ground disturbance	9,114 acres total: 2,374 acres infrastructure 6,740 acres work areas	6,953 acres total: 1,811 acres infrastructure 5,142 acres work areas	4,838 acres total: 1,124 acres infrastructure 3,714 acres work areas	5,136 acres total: 1,402 acres infrastructure 3,734 acres work areas	4,492 acres total 992 acres infrastructure 3,500 acres work areas
Total project access roads (see also Table 2.4-2)	486 miles new 147 miles improved	360 miles new 117 miles improved	270 miles new 83 miles improved	272 miles new 101 miles improved	231 miles new 79 miles improved
Construction crane path	33 miles new 14 miles improved	26 miles new 10 miles improved	23 miles new 7 miles improved	19 miles new 5 miles improved	14 miles new 5 miles improved
Vehicle traffic[†] (see also Table 2.4-3)	2,427,698 trips total: 812,882 trips construction 901,740 trips operation 713,076 trips decommissioning	2,696,164 trips total: 1,057,221 trips construction 868,043 trips operation 801,539 trips decommissioning	1,900,489 trips total: 669,985 trips construction 630,704 trips operation 599,800 trips decommissioning	2,092,141 trips total: 840,414 trips construction 608,269 trips operation 643,458 trips decommissioning	1,926,583 trips total: 748,878 trips construction 545,868 trips operation 631,837 trips decommissioning
Fixed-wing aircraft traffic	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation	90 days total 3 days/year (8 hours/day) operation
Helicopter traffic[‡]	390 days total 240 days (8 hours/day) construction 150 days (40 hours/year) operation	390 days total 240 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation	370 days total 220 days (8 hours/day) construction 150 days (40 hours/year) operation
Blasting	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction	2 blasts/day construction
Water use	191,750,000 gallons total: 160,000,000 gallons construction 13,300,000 gallons operation and maintenance 18,450,000 gallons decommissioning	262,310,000 gallons total: 230,000,000 gallons construction 12,810,000 gallons operation and maintenance 19,500,000 gallons decommissioning	198,280,000 gallons total: 175,000,000 gallons construction 9,280,000 gallons operation and maintenance 14,000,000 gallons decommissioning	192,450,000 gallons total: 170,000,000 gallons construction 8,950,000 gallons operation and maintenance 13,500,000 gallons decommissioning	172,000,000 gallons total: 150,000,000 gallons construction 9,000,000 gallons operation and maintenance 13,000,000 gallons decommissioning
Groundwater wells	6 construction; 4 remain open during operation and decommissioning	5 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning	4 construction; 4 remain open during operation and decommissioning
Livestock fencing (20%–25% of the temporary fencing may be deployed at any given time) (up to 3 years construction, up to 3 years decommissioning)	395 miles temporary	303 miles temporary	222 miles temporary	257 miles temporary	200 miles temporary
Range improvements	Up to 65 new troughs Up to 54 new waterline miles	Up to 55 new troughs Up to 54 new waterline miles	Up to 40 new troughs Up to 27 new waterline miles	Up to 40 new troughs Up to 42 new waterline miles	Up to 40 new troughs Up to 42 new waterline miles
Personnel	400–850 construction and decommissioning 20–75 operation and maintenance	400–850 construction and decommissioning 20–75 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance	300–700 construction and decommissioning 17–62 operation and maintenance

Project Component	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Collector substations	5 substations	5 substations	5 substations	4 substations	4 substations
230/500-kV substation	1 substation	1 substation	1 substation	1 substation	1 substation
Interconnection substation	1 substation	1 substation	1 substation	1 substation	1 substation
34.5-kV underground and overhead collector lines	248 miles total: 56 miles underground 192 miles overhead Estimated 3,455 poles	201 miles total: 53 miles underground 148 miles overhead Estimated 2,664 poles	150 miles total: 39 miles underground 111 miles overhead Estimated 1,998 poles	145 miles total: 38 miles underground 107 miles overhead Estimated 1,926 poles	156 miles total: 34 miles underground 122 miles overhead Estimated 2,196 poles
230-kV transmission line	34 miles Estimated 306 support structures	34 miles Estimated 306 support structures	21 miles Estimated 189 support structures	25 miles Estimated 225 support structures	24 miles Estimated 218 support structures
500-kV transmission line	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures	19 miles Estimated 114 support structures
Battery energy storage system	1 system	1 system	1 system	1 system	1 system
Operation and maintenance facilities	3 facilities	3 facilities	3 facilities	3 facilities	3 facilities
Laydown and staging yards	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation	Up to 7 yards construction and decommissioning Up to 3 yards operation
Concrete batch plants	3 batch plants	3 batch plants	3 batch plants	3 batch plants	3 batch plants
Meteorological (met) towers	5 permanent towers (260–460 feet tall) 19 temporary towers (up to 460 feet tall, 2–3 years)	5 permanent towers (260–460 feet tall) 19 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)	4 permanent towers (260–460 feet tall) 13 temporary towers (up to 460 feet tall, 2–3 years)
Aircraft detection lighting system towers	4 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)	3 permanent towers (260–460 feet tall)
New impervious surface (for substations and buildings)	13.5 acres	13 acres	10 acres	9.5 acres	9.5 acres
Intermodal yards	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka	1–2 existing yards on private land near the towns of Shoshone or Minidoka

Note: See Section 2.3.2 (Work Area and Infrastructure Disturbance) for definitions of work area and infrastructure disturbance.

* The minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 6-MW turbines.

§ TWh are megawatt hours multiplied by 1 million or gigawatt-hours multiplied by 1,000. Annual net capacity factor is the ratio of the net electricity generated in 1 year to the energy that could have been generated at continuous full-power operation in 1 year.

† All trips one way, as reported in Appendix J of MVE (2023). Using one-way trips helps simplify the analysis and provides a more accurate result. For all action alternatives, operational trips are estimated for a 30-year operation phase. Construction and decommissioning trips are estimated for a 2-year phase for Alternative B and a 3-year phase for Alternatives C through E and the Preferred Alternative.

‡ No helicopter use would occur during decommissioning.

Table 2.4-2. Access Road Categories and Mileages within the Siting Corridors

Access Road Details	Road Widths	Alternative B* (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Typical access roads	24 feet wide (20-foot road surface with 2 feet of berm or ditch on either side)	167 miles new 117 miles improved	121 miles new 91 miles improved	90 miles new 60 miles improved	94 miles new 80 miles improved	82 miles new 58 miles improved
Construction crane path	50 feet wide (interim reclamation planned during operation)	33 miles new 14 miles improved	26 miles new 10 miles improved	23 miles new 7 miles improved	19 miles new 5 miles improved	14 miles new 5 miles improved
500-kV transmission line access roads	24 feet wide (16 feet wide during operation)	3 miles new 16 miles improved	3 miles new 16 miles improved	3 miles new 16 miles improved	3 miles new 16 miles improved	3 miles new 16 miles improved
230-kV transmission line access roads	24 feet wide (16 feet wide during operation)	34 miles new	34 miles new	21 miles new	25 miles new	19 miles new
34.5-kV collector line access roads	14 feet wide (10 feet wide during operation)	248 miles new	176 miles new	133 miles new	131 miles new	131 miles new
Total project access roads	**–**	**486 miles new** **147 miles improved**	**360 miles new** **117 miles improved**	**270 miles new** **83 miles improved**	**272 miles new** **101 miles improved**	**231 miles new** **79 miles improved**
County roads used to access project	–	79 miles	69 miles	47 miles	51 miles	44 miles
Highways used to access project	–	38 miles	33 miles	23 miles	33 miles	33 miles

Note: See the Access Roads section of EIS Appendix 11 for detailed descriptions of these road categories.

* Since MVE (2023) includes contingency calculations and the project is still a preliminary design, there may be differences between the mileages included in MVE (2023) and this EIS. If the project is authorized by the BLM, a measure to minimize road construction would be included as part of the ROW authorization.

Table 2.4-3. Traffic Details

Trip Details	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Total trips	2,427,698	2,696,164	1,900,489	2,092,141	1,926,583
Trips per day	Construction: 1,103 average, range 11–2,032 Operation: 38 average, range 38–134 Decommissioning: 1,270 average, range 13–1,830	Construction: 1,329 average, range 13–2,563 Operation: 37 average, range 37–134 Decommissioning: 1,241 average, range 15–2,053	Construction: 909 average, range 9–1,671 Operation: 27 average, range 27–134 Decommissioning: 1,068 average, range 11–1,535	Construction: 1,075 average, range 11–2,097 Operation: 26 average, range 26–134 Decommissioning: 958 average, range 12–1,647	Construction: 968 average, range 10–1,866 Operation: 23 average, range 23–134 Decommissioning: 978 average, range 12–1,617
Trips per hour	Construction:1–170 Operation: 5–17 Decommissioning: 1–153	Construction: 1–214 Operation: 5–17 Decommissioning: 1–171	Construction: 1–139 Operation: 3–17 Decommissioning: 1–128	Construction: 1–175 Operation: 3–17 Decommissioning: 1–137	Construction: 1–156 Operation: 3–17 Decommissioning: 1–135

Note: All trips are one way, as reported in Appendix J of MVE (2023). Using one-way trips helps simplify the analysis and provides a more accurate result. Work hours (and thus traffic) would occur 12 hours per day during construction and decommissioning and 8 to 12 hours per day during operation. Construction and decommissioning traffic would occur 7 days per week. For all action alternatives, operational trips are estimated for a 30-year operation phase. Construction and decommissioning trips are estimated for a 2-year phase for Alternative B and a 3-year phase for Alternatives C through E and the Preferred Alternative.

Figure 2.4-1. Action alternatives comparison.

Figure 2.4-2. Action alternatives comparison by siting corridor types.

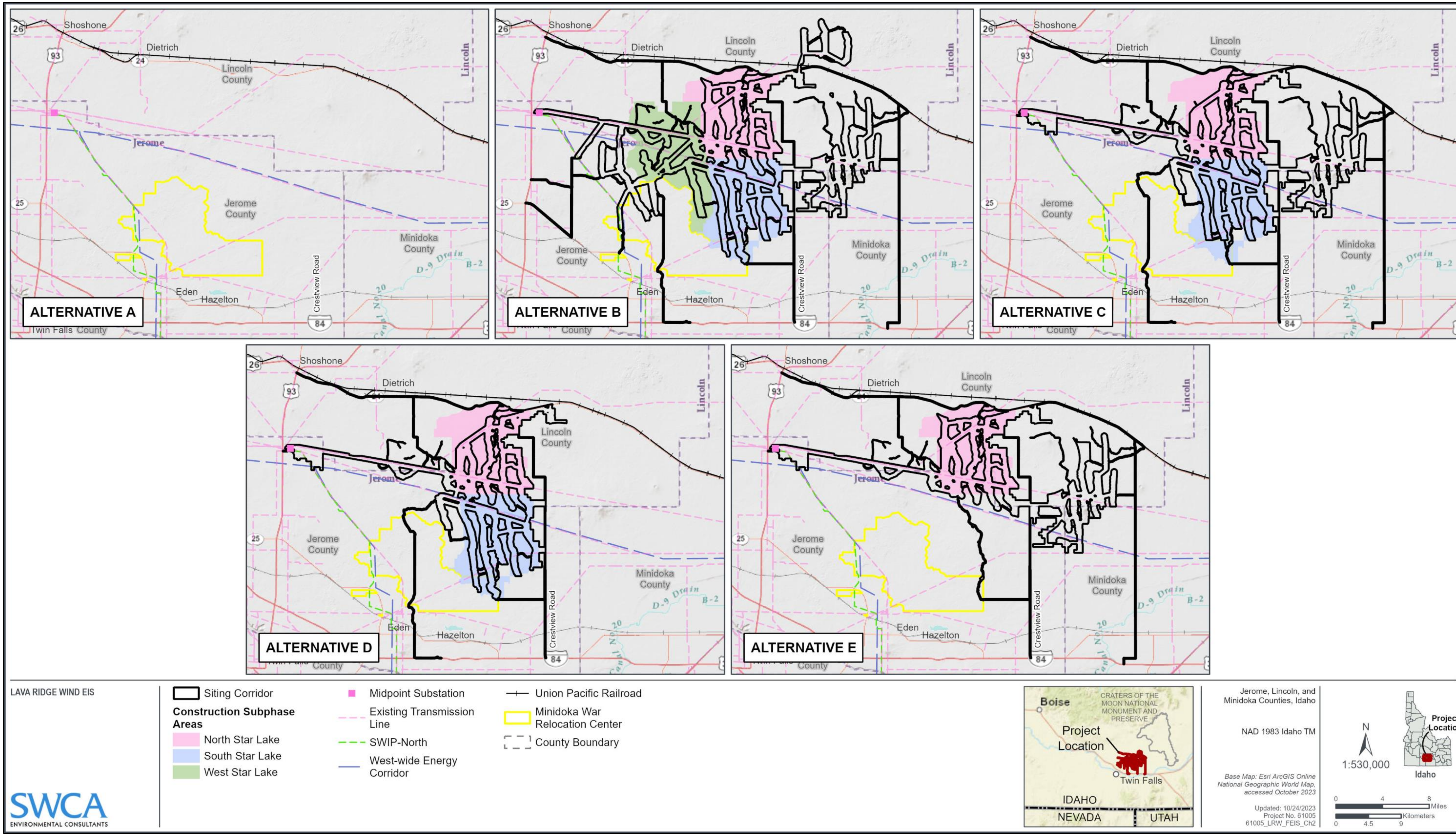

Figure 2.4-3. Subphasing comparison for Alternatives A, B, C, D, and E.

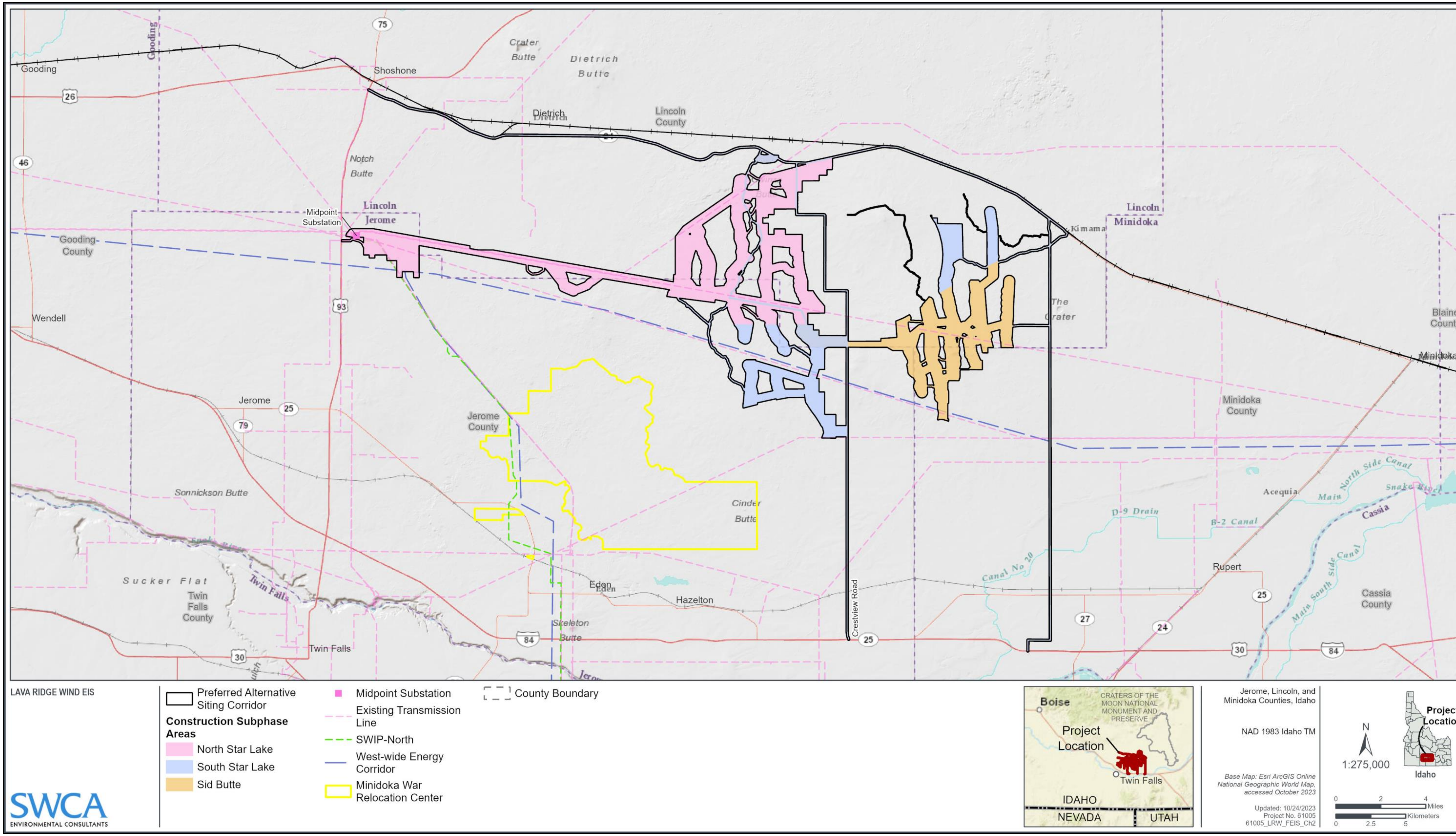

Figure 2.4-4. Subphasing for the Preferred Alternative.

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2.5 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would reduce the project's overall extent by eliminating development within specific corridors (see Figures 2.4-1 and 2.4-2). The intent of this alternative is to avoid and minimize potential impacts to Wilson Butte Cave, Minidoka NHS, and the communities that have connections to these places. Alternative C would also aim to encourage development in areas that have already been impacted by energy infrastructure and reduce the extent of wildlife habitat fragmentation.

Under Alternative C, the southwest and northeast siting corridors (proposed in Alternative B) would not be considered for wind turbine siting, but some of these corridors would still allow for access or powerline development. Alternative C would also limit the project's 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. The 500-kV transmission line would have the flexibility to interconnect with the Midpoint Substation or an alternative new substation along the SWIP-North alignment. However, the interconnection with the SWIP-North alignment would be in an area adjacent to the Midpoint Substation. Alternative C would also not allow for improvement of the road segment that traverses Wilson Butte and provides access to Wilson Butte Cave.

Alternative C would not include siting corridors nearest to and in the most prominent viewing directions of Wilson Butte Cave and Minidoka NHS. The intent is to reduce impacts to the setting and feeling of these places while still maintaining connectivity of turbine corridors to the main substation and maintaining electricity generation. The draft viewshed analysis for key observation point (KOP) 1 and KOP 10 and visual simulations that show potential placement of the turbines (SWCA Environmental Consultants [SWCA] 2023) were reviewed to inform the alignment of this alternative. KOPs are viewpoints where there is public sensitivity to visual change (BLM 1986, as amended). Portions of corridors were removed from within the boundary of the historic Hunt War Relocation Center also called the Minidoka WRC associated with Minidoka NHS. The only project infrastructure that would remain in the Minidoka WRC boundary would be access roads.

Alternative C would not include siting corridors north of ID 24. The intent is to minimize the extent of wildlife habitat fragmentation and reduce considerable development in areas that are relatively undeveloped and have a low potential to be successfully reclaimed. Although there are large blocks of public land south of ID 24, these public lands are crossed by major transmission lines and are intermingled with agricultural areas and associated infrastructure that can limit wildlife movement from one area to another. Relative to the public lands south of ID 24, the public lands north of the highway are contiguous and have limited obstructions to wildlife movement. Another intent of not including siting corridors north of ID 24 is to avoid the introduction of elements that could disconnect greater sage-grouse leks located just north of the highway from nesting and brood rearing habitat to the northeast.

Alternative C would not include siting corridors north of ID 24 (see Figures 2.4-1 and 2.4-2). The intent is to provide for a path with fewer obstructions to the western end of the project for pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) migration.

Alternative C construction subphases would be the same as Alternative B.

See Tables 2.4-1 through 2.4-3 for the Alternative C project components and a detailed comparison to these components for Alternatives B, D, and E.

2.6 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Like Alternative C, Alternative D would reduce the project's overall extent by eliminating specific siting corridors from development (see Figures 2.4-1 and 2.4-2). Also similar to Alternative C, Alternative D would focus on minimizing fragmentation of wildlife habitat and potential impacts to Wilson Butte Cave, Minidoka NHS, and the communities that have connections to these places.

Therefore, Alternative D would eliminate nearly the same siting corridors that are eliminated under Alternative C, and additionally would not include most of the siting corridors east of Crestview Road. The intent of Alternative D is to avoid development in areas that have higher sagebrush cover and protect functional sage-grouse habitat. The reduced overall project footprint would also avoid or minimize impacts to other resources and areas of concern. As a result of this additional avoidance, the total acres in the siting corridors under Alternative D would be the second smallest of the action alternatives (only the Preferred Alternative would be smaller). Therefore, the analysis of Alternative D provides insight on how a reduced development scenario would result in potential trade-offs within a different development area. Since this alternative would avoid most impacts to greater sage-grouse habitat, it would require less off-site mitigation than Alternative B and the other action alternatives.

Similar to Alternative C, Alternative D would reduce potential impacts to Minidoka NHS and the Minidoka WRC. The only project infrastructure that would remain in the Minidoka WRC boundary would be access roads.

Alternative D construction subphases would be the same as Alternative B.

See Tables 2.4-1 through 2.4-3 for the Alternative D project components and a detailed comparison to these components for Alternatives B, C, and E.

2.7 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The intent of Alternative E is to avoid and minimize potential impacts to Minidoka NHS and Japanese American communities associated with the site. Alternative E builds off of Alternative C but would further avoid and minimize potential impacts to the setting and feeling of Minidoka NHS by removing additional siting corridors from development (see Figures 2.4-1 and 2.4-2). Removing additional siting corridors would also reduce potential impacts to the ability of descendant communities and the general public to experience Minidoka NHS.

Alternative E would eliminate the same siting corridors that are eliminated under Alternative C (which also reduces potential impacts to Wilson Butte Cave) and would continue to limit the project’s 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. Alternative E would also eliminate most of the siting corridors west of Crestview Road and south of the Section 368 West-wide Energy Corridor (WEC).

These siting corridor eliminations are intended to further reduce visibility of the project from Minidoka NHS. Viewshed mapping and visual simulations from Minidoka NHS (SWCA 2024) were used to identify the turbine corridors that had the potential to introduce a strong or moderate degree of visual contrast.

Alternative E proposes the same adjustments to siting corridors located north of ID 24 that are made in Alternative C. However, portions of some corridors are included in Alternative E that are not included in Alternative C. This corridor configuration is intended to provide an assessment of the potential impacts resulting from these specific corridors in combination with a smaller project footprint and minimization measures.

Alternative E construction subphases would be the same as Alternative B.

See Tables 2.4-1 through 2.4-3 for the Alternative E project components and a detailed comparison to these components for Alternatives B, C, and D.

2.8 PREFERRED ALTERNATIVE

The BLM has identified a Preferred Alternative based on a combination of elements of Alternatives B, C, D, and E, which the BLM examined in the draft EIS. The Preferred Alternative responds to resource impact concerns raised by cooperating agencies and the public through the public comments received on the draft EIS. The Preferred Alternative would reduce visual impacts to Minidoka NHS and Wilson Butte Cave by having the greatest distance between these sites and turbine siting corridors, reduce disturbance to big game migration routes and winter concentration areas, reduce impacts to Jerome County Airport and agricultural aviation uses, and reduce impacts to non-participating private landowners. The combination of elements from Alternatives B through E for the Preferred Alternative include siting corridor and infrastructure adjustments to avoid or minimize impacts while balancing development of the wind resource (see Figures 2.4-1 and 2.4-2). To identify the Preferred Alternative, the BLM considered, in part, the following information: results of the analysis of potential impacts prepared for the draft EIS; agency, stakeholder, and public feedback on the draft EIS; recommendations from the BLM Idaho Resource Advisory Council's Lava Ridge Wind Project Subcommittee; new wildlife datasets provided by the Idaho Department of Fish and Game (IDFG); and publicly available wind speed information for the project area.

2.8.1 Project Components

To reduce visibility of the project from Minidoka NHS, the Preferred Alternative would increase the distance of turbine corridors from Minidoka NHS as compared to Alternatives C and D. Under the Preferred Alternative, all but one turbine corridor would be located outside of the immediate foreground and foreground of Minidoka NHS. The one turbine corridor retained within the foreground would be located approximately 9.5 miles from the Minidoka NHS Visitor Center and would be obstructed by existing infrastructure on adjacent farmland. Additionally, the Preferred Alternative would include a maximum turbine tip height limit for all turbines of 660 feet. The Preferred Alternative would have the lowest number of turbines visible from and within the foreground of Minidoka NHS; it would also have the lowest maximum tip height of all action alternatives.

To minimize development within big game migration routes and winter concentration areas, the Preferred Alternative would exclude siting corridors north of ID 24 and north of Idaho Power Company line 805, exclude siting corridors north of the Milner-Gooding Canal, and exclude corridors east of Crestview Road and west of Kimama Butte. In comparison to Alternatives C and D, the Preferred Alternative would reduce the amount of siting corridors in the southern part of the project area but maintain some corridors northeast of big game winter concentration areas. The Preferred Alternative would also include two additional project component adjustments to reduce impacts to big game migration routes and winter concentration areas: 1) access roads that would enter the project from the north near Star Lake and from the south near Cinder Butte would be removed and 2) locations for operational and maintenance buildings would be limited to areas near existing county roads or highways to reduce the need for project workforce access into the center of the project area.

The siting corridor exclusions and maximum turbine tip height described above were also designed to increase turbine siting corridor distance from the Jerome County Airport and to facilitate more options for flight paths to agriculture lands in the central portion of the project.

To minimize impacts to non-participating private landowners, the Preferred Alternative would include a setback distance of 1.5 times the maximum turbine tip height, or 1,000 feet (whichever is greater), from the property line of non-participating private landowners and 5 times the total turbine height from existing residences. When the setbacks are applied to a maximum turbine height of 660 feet, the setback from the property line would be 1,000 feet (0.19 mile), and the setback from residences would be 3,300 feet (0.63 mile).

2.8.2 Construction Phasing

As described in Section 2.3.3, the Preferred Alternative would be constructed in approximately 3 years. The Preferred Alternative would be constructed in subphases to concentrate activities in a single area at a time; however, the subphase locations would differ from those described under Alternatives B, C, D, and E. Similar to Alternative B, concentrating construction activities in a single subphase area at a time would reduce the potential for conflicts between construction activities and livestock operations, reduce the amount of temporary fence necessary during construction, provide the public better predictability for areas not experiencing construction traffic, and make areas available for wildlife to avoid human noise and activity from construction.

Under the Preferred Alternative, the BLM would include a term and condition requiring a phased construction schedule that would focus major construction activities within a single region of the project area at a time, require adherence to seasonal wildlife restrictions and measures aimed to reduce impacts to wildlife during crucial time periods (see EIS Appendix 4 for applicant-committed measures and BLM mitigation measures), and provide the necessary timing elements for the BLM and grazing permittees to plan and coordinate grazing operations before and throughout the construction of the project. Construction would be divided into three subphase areas: North Star Lake, South Star Lake, and Sid Butte (see Figure 2.4-4). Although MVE would develop a final construction schedule in coordination with the BLM and grazing permittees before construction, it is anticipated that construction year 1 would occur in the North Star Lake subphase area, construction year 2 would occur in the Sid Butte subphase area, and construction year 3 would occur in the South Star Lake subphase area. A plan that allows for a shorter construction timeframe may also be considered if it focuses major construction activities within a single region of the project area at a time and not in areas actively being used by permittees. Similar to Alternatives B, C, D, and E, primary access roads to a construction subphase area would continue to be used through the previously completed subphase areas to allow for sufficient project access.

See Tables 2.4-1 through 2.4-3 for the Preferred Alternative project components and a detailed comparison to these components for Alternatives B, C, D, and E.

2.9 BLM ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

This section describes five alternatives considered by the BLM during alternatives development that are not analyzed in detail in this EIS. See Figure 2.9-1 at the end of this section for a map of these alternatives. Refer also to Section 2.1 (Alternatives Development Process) for the five criteria used to determine whether alternatives were carried forward for detailed analysis.

2.9.1 Alternative F

Alternative F would remove the same siting corridors from development that were removed for Alternative C (for the same reasons) and would remove additional corridors on the western end of the project that are within assumed big game migration areas (see Figure 2.9-1).

The intent of Alternative F was to address concerns for potential impacts to big game from development in winter and migratory habitats. After Alternative F's initial proposal was developed, additional coordination with cooperating agencies highlighted that the current information on the locations of big game migratory corridors was based on limited data, and it is likely that big game would use all of the siting corridors as winter habitat and for migration. These discussions identified that minimization measures would be more effective at lessening impacts on big game than alternatives that targeted specific siting corridors. Since the benefit of removing siting corridors from the identified migration corridors is uncertain, Alternative F would not substantially reduce impacts beyond the alternatives analyzed in detail. Therefore, Alternative F was not brought forward for detailed analysis in this EIS because Alternatives C and D would have similar impacts and would provide a reasonable range of alternatives that evaluate reducing impacts to big game.

2.9.2 Alternatives C(2) and F(2)

Alternatives C(2) and F(2) would be the same as Alternative C and Alternative F, respectively, but would also add siting corridors in the northeast corner of the project that would be within 3.1 miles of a greater sage-grouse lek (see Figure 2.9-1). MVE initially proposed these siting corridors but later removed them from Alternative B because they are located within 3.1 miles of a lek (see Section 2.3.4 [Avoidance and Minimization]). For Alternative C(2) or Alternative F(2) to be a selectable alternative, a land use plan amendment would be required. After consideration of these alternatives, the BLM concluded that an adequate range of alternatives could be developed that would be technically and economically feasible and satisfy MVE's development goals while minimizing impacts to other resources. For these reasons, alternatives that would require a plan amendment to allow for more development at the cost of increased impacts to greater sage-grouse habitat were not needed.

2.9.3 Alternative G

Alternative G was the result of a discussion with the BLM interdisciplinary team that was aimed at exploring what additional options were available for balancing the resource issues that were addressed in Alternative C (big game migration) but retaining more of the corridors proposed by Alternative B (see Figure 2.9-1). This alternative would have the same layout as Alternative C but would add several siting corridors north of ID 24. The alternative was dismissed from further consideration because the components of the alternative were being analyzed in other alternatives and therefore would not contribute to additional information concerning potential impacts (i.e., the alternative would be substantially similar in design to alternatives that are analyzed in detail).

2.9.4 Alternative H

Alternative H was considered in order to examine an alternative that eliminates potential impacts to the visual landscape surrounding the Minidoka NHS. Alternative H considered a project layout that would only include turbine siting corridors that were identified through a GIS terrain analysis as being not visible from the Minidoka NHS (see Figure 2.9-1). The turbine siting corridors that could be developed under this alternative would be located northeast of Kimama Butte, east of Sid Butte, and north of ID 24. Siting corridors located within the Minidoka NHS viewshed would still be proposed for project use (e.g., access roads, transmission lines, substations, and other supporting infrastructure); however, these project components are unlikely to be visible from the Minidoka NHS. Additionally, to ensure turbines are not visible from the Minidoka NHS under Alternative H, the turbine heights would be limited to no more than 545 feet. Table 2.9-1 provides an estimate of project components that would be developed within the siting corridors under Alternative H.

Table 2.9-1. Project Components for Alternative H

Project Component	Quantity
Siting corridors	29,000 acres
Wind turbines	Up to 84 3-MW turbines
Estimated generation capacity*	252 MW
Ground disturbance	2,900 acres
Collector substations	3 substations
230/500-kV substation	1 substation
Interconnection substation	1 substation
34.5-kV underground and overhead collector lines	At least 65 miles
230-kV transmission line	25 miles
500-kV transmission line	19 miles
Total project access roads	55 miles new road 80 miles improved road

* Estimated generation capacity of 252 MW has been estimated with the assumption that the 3-MW turbines would be installed.

Like other alternatives, Alternative H proposes a subset of siting corridors that were described in Alternative B (the Proposed Action) and does not consider locating turbines outside those siting corridors (see Section 2.1). The siting corridors considered for Alternative H were identified by MVE as having the wind resource characteristics needed to support a wind energy project as a part of the total project as proposed under Alternative B. However, under Alternative B, some of the corridors were identified as "alternate" siting locations, and these siting locations would be developed if development in more optimal locations was found to be infeasible. Approximately 40% of the siting corridors used in Alternative H are siting corridors that were identified as "alternate" in Alternative B and have a lower modeled wind speed. The 100-meter aboveground modeled wind speed for the 40% of siting corridors in Alternative H that were identified as "alternate" locations in Alternative B is in the mid- to lower 6 meters per second. This is less than the majority of the rest of the project area, which is shown to have modeled wind speeds in the upper 6 meters per second and into the 7 meters per second.

Alternative H would site most project components on BLM public lands and some State of Idaho lands. The project phases under Alternative H would be the same as presented for Alternative B, including following applicant-committed measures, mitigation required by BLM policy, and additional project-specific mitigation.

Alternative H would not include a specific limit of the turbine model or generation capacity, but because the total height would be restricted, it is anticipated that turbines with a 3-MW generation capacity or less would be installed. The total amount of power collector lines, access roads, and substations needed would be reduced compared to other alternatives. However, because the project would continue to have an interconnection point at Midpoint Substation or the SWIP-North alignment, the same or similar length of 230-kV and 500-kV transmission lines is estimated for Alternative H.

When considering Alternative H, the BLM reviewed where project components could be sited to eliminate visual impacts to Minidoka NHS and how these locations meet the core siting requirements for renewable wind projects: high-quality wind resource, available land, suitable transmission, and environmental issues. Two of the core siting requirements, wind resource quality and access to suitable transmission, reduce the feasibility of Alternative H compared to Alternative B and other action alternatives.

Publicly available modeled wind speed estimates for the project area were used to better understand the wind variability within the project area (Argonne National Laboratory 2023; Davis et al. 2023). The information showed that the wind resource varies with topographic features and associated changes in elevation that are present across the project area. Alternative H would result in siting 35 of the 84 turbines in turbine siting corridors that were identified by MVE in Alternative B as “alternate” siting locations (see Section 1.3.5 of MVE [2023]). These siting corridors would only be developed under Alternative B if primary locations were determined infeasible to develop. These corridors are a second choice for a variety of reasons, but it is understood that a major consideration is that the wind resource has less potential for generating electricity and higher development costs if not developed in conjunction with other siting corridors as proposed in Alternative B. The BLM assumed Alternative H would have approximately 20% of the generation capacity of Alternative B and would require developing infrastructure in areas of lower wind potential. The estimate of 20% is conservative and a best-case scenario because it assumes the lower end of generation capacity of Alternative B (1,200 MW). This comparison also does not account for the potential variation in the wind resource because it is a comparison of the nameplate generation capacity and not of the potential annual generation. Since 35 of the 84 turbines would be located in areas that have a lower quality wind resource, it is likely that Alternative H would result in less electricity generated than the estimated 20% of Alternative B.

Alternative H, like Alternative B, would include an interconnection at the Midpoint Substation or construction of a new substation and interconnect with the SWIP-North alignment to access suitable transmission to energy markets. The turbine siting corridors proposed in Alternative H are located at the eastern and northern ends of the project area, and the interconnection at the Midpoint Substation or SWIP-North alignment is located on the western side of the project area. This results in Alternative H requiring the same amount of 230-kV transmission lines (25 miles) and 500-kV transmission lines (19 miles) to access suitable transmission to energy markets. The amount of project-related transmission lines is a major factor for determining if a renewable energy project is feasible. Although Alternative H would require the same amount of project transmission lines as Alternative B, the other project components would only provide approximately 20% of the generation capacity of Alternative B.

The purpose of considering Alternative H was to identify whether there was a feasible alternative that could eliminate all visual impacts to the Minidoka NHS, because the other action alternatives considered focus on reducing these impacts but not fully eliminating them. Since no turbines would be visible, Alternative H and the No Action would have similar, if not the same, visual impacts to the Minidoka NHS. Unlike the No Action, Alternative H would have some capacity to generate electricity. However, given that Alternative H would generate approximately 80% less electricity compared to Alternative B and the distance to suitable transmission may not be supported by a smaller project, Alternative H was not considered as an economically feasible alternative. With the No Action, Alternative B, and other action alternatives, this EIS includes a reasonable range of alternatives that cover the full spectrum needed by NEPA to evaluate the differences in potential impacts relevant to the issues identified.

The total lower generation capacity in combination with the cost to develop the project are primary factors in determining the cost per megawatt at which the electricity would need to be sold. Since the development costs are not proportionally reduced under Alternative H to the reduced amount of electricity generation, this would require the electricity to be sold at a higher rate. To be economically feasible, smaller projects require lower development costs, a higher power purchase agreement price, or a combination of both.

As described in comments received on the draft EIS, there are smaller wind projects that have been developed in Idaho. Although the development cost information was not publicly available for these projects, there is information that shows at the time these projects were developed, rates established in power purchase agreements were higher. Cost trends for wind projects in the United States are described in the U.S. Department of Energy (DOE) *Land-Based Wind Market Report* (2023) and show that the levelized power purchase agreement prices were significantly higher in western markets when the existing wind projects in Idaho were being developed and coming online in 2009, 2010, 2011, and 2012 (Hoen et al. 2018 [version 6.1, released November 28, 2023])

In addition to Alternative H, as described above, the BLM considered whether an alternative that used the same wind turbine development but included an interconnection point along existing transmission lines located within the project area would be feasible. These transmission lines are west of the Borah West transmission path and east of Midpoint West transmission path. as described in Idaho Power's 2023 *Integrated Resource Plan*. Idaho Power describes these paths as having heavy east–west flows during low hydro operating conditions (which can occur daily or seasonally) and states that "additional transmission capacity will likely be required if new resources or market purchase are located east of theses path(s)" (Idaho Power 2023). This information indicates there is already a large amount of electricity that takes up transmission capacity on the existing lines, and it is likely that new transmission lines (like the proposed Lava Ridge Wind transmission line) would be required. Additionally, there currently are no substations at locations within the project area that would allow for interconnection, and MVE does not have an interconnection agreement that would allow them to develop connection points in these locations.

Alternative H, as described above, includes interconnection at the Midpoint Substation, as MVE has an interconnection agreement with Idaho Power. This ensures the project can feasibly connect to the exiting electrical grid and deliver power to existing markets. Alternative H also assumes interconnection with the SWIP-North could provide a feasible alternative to interconnection at the Midpoint Substation. This assumption is based on LS Power being the parent company of both MVE and Great Basin Transmission (holder of and developer of the SWIP-North transmission line ROW). Without existing substations or an interconnection agreement indicating adequate transmission capacity at locations within the project area, the options to connect to the grid in these locations are not currently feasible.

2.9.5 Alternative Components

The BLM evaluated painting one turbine blade black on each turbine because this has been documented to reduce bird fatalities by 70% in Europe (May et al. 2020). However, this would not comply with Federal Aviation Administration (FAA) standards (FAA 2020) and was not carried forward for detailed analysis.

Figure 2.9-1. Alternatives considered but eliminated from detailed analysis.

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CHAPTER 3. AFFECTED ENVIRONMENT AND IMPACTS

3.1 INTRODUCTION AND METHODOLOGY

This chapter describes the affected environment and impacts of the Proposed Action and alternatives relative to the issues analyzed in detail. (Issues analyzed in brief are described in EIS Appendix 3.) The affected environment for each resource describes the current conditions and includes past, present, and reasonably foreseeable trends and actions that are related to, and potentially add to or balance out, the impacts of the Proposed Action and alternatives. Impacts are reasonable changes to the affected environment potentially caused by the Proposed Action and alternatives. Impacts include those that occur in the same time and place, as well as those impacts that occur later in time or are further removed in distance, from the Proposed Action or alternatives.

3.1.1 Existing and Future Trends and Actions

Existing and future trends and actions are those that have occurred in the past and are expected to continue to occur into the future. Reasonably foreseeable actions are those that have existing decisions, funding, or formal proposals or are highly probable. When combined with past and present actions, the reasonably foreseeable trends and actions form the affected environment for each of the issues analyzed in this chapter. Table 3.1-1 describes existing and future trends and actions (for which information is publicly available) near the siting corridors identified for this analysis and shown in Figure 3.1-1.

Table 3.1-1. Existing and Future Trends and Actions Near the Siting Corridors Identified for this Analysis

Existing and Future Trends and Actions	Description
Climate change	The existing trend of a warming climate is projected to continue in the future (see Section 3.4 [Climate and Greenhouse Gases]). Although there are differences in the modeled degree and rate of change, some general trends in Idaho are projected (Runkle et al. 2022), as follows: The potential for more frequent and extreme droughts in the future and a decrease in predicted snow-pack accumulation. An increased frequency of wildfire occurrence and severity. The annual average temperature, which has increased by approximately 2 degrees Fahrenheit since the early twentieth century, is projected to continue to increase in the future along with incidences of extreme heat events.
Agricultural land use	Agricultural use is a dominant land use on private lands adjacent to the siting corridors and throughout Magic Valley. Agricultural lands are represented in the analysis as acres of cultivated lands.
Livestock grazing	Livestock grazing occurs within allotments on public and private lands. Livestock grazing also includes associated infrastructure such as water pipelines, wells, pump houses, storage tanks, troughs, cattleguards, watering ponds, fences, access roads, and gates. Please see the Livestock Grazing section (Section 3.9) for additional details.
Population and economic growth	The population and economy in Lincoln, Jerome, and Minidoka Counties (the tri-county area where the siting corridors are located) have grown over the past decade and are forecast to continue growing. Please see the Environmental Justice and Socioeconomics section (Section 3.6) for additional details on population growth and associated economic trends, including employment and housing.
Linear transportation	Public highways and roads are represented by the existing paved road network. Additional linear transportation includes private railroad infrastructure. Proposed highway infrastructure projects include the following: **Interstate 84 (I-84)/ID 50 Kimberly Interchange Project:** The ITD is planning on rebuilding the Kimberly Interchange (Exit 182 at ID 50). The project is currently in the planning and design phase and is proposed for construction in 2024. **U.S. Highway 93 (U.S. 93) corridor improvements from I-84 to ID 25 (Jerome County Environmental Assessment):** The U.S. 93 corridor from I-84 to ID 25 has undergone several improvements to increase roadway capacity and improve safety since early 2017. The primary improvements include road widening and intersection improvements. The final (fourth) phase of improvements on U.S. 93, from just south of the Eastern Idaho Railroad crossing to East 300 South, is currently underway.
Motorized access	Motorized access and off-highway vehicle (OHV) use occur on private and public lands and are represented in the analysis by the existing unpaved road network. Motorized access is managed by the applicable management agency (BLM, NPS, U.S. Forest Service [USFS], U.S. Fish and Wildlife Service [USFWS], BOR, Idaho Department of Lands, etc.).
Electrical infrastructure	Several existing high-voltage linear electrical transmission lines and corridors and associated substations or switchyards are on private and public lands. Four existing transmission lines cross the Lava Ridge siting corridors (see Figure 3.1-1): the Midpoint to Adelaide 345-kV transmission line, the Midpoint to Borah 345-kV transmission line, the Midpoint to Kinport 345-kV transmission line, and the Midpoint to Valmy 345-kV transmission line. These are detailed below. One other transmission line, the Midpoint to Hemingway 500-kV transmission line, is nearby. **WEC:** The WEC (or Section 368 corridors) is a network of designated corridors across BLM and USFS public lands in 11 western states for pipelines and electrical transmission and distribution facilities. The BLM and USFS designated corridors through land use planning processes in 2008 consistent with the direction in Section 368 of the Energy Policy Act of 2005. Two 3,500-foot-wide designated Section 368 corridors (49-122 and 112-226) traverse the Lava Ridge siting corridors, portions of which are already developed or are currently being developed for energy transfer. One Section 368 corridor runs roughly east to west from the Borah

Existing and Future Trends and Actions	Description
	Substation near American Falls, Idaho, to the Midpoint Substation south of Shoshone, Idaho. The other runs from north to south from the Cedar Hill Substation to the Midpoint Substation. **Midpoint Substation:** The Midpoint Substation is an existing high-voltage substation facility operated by Idaho Power Company and located on private lands. The substation is west of the Lava Ridge siting corridors and approximately 7 miles south of Shoshone. Multiple existing and proposed transmission lines use (or would use) this substation, including the Lava Ridge project. **SWIP-North:** The SWIP-North transmission line corridor is west and southwest of the siting corridors. SWIP-North is Phase III of an authorized 500-kV transmission line corridor from Idaho to California proposed to be co-located with the north-south Section 368 corridors, terminating at the Midpoint Substation. Construction is anticipated to start in 2025, with an anticipated completion date in 2027. The BLM authorized this corridor across public lands to Great Basin Transmission Company. The transmission line would be partially financed by the Western Area Power Administration. **Gateway West Transmission Line Project Segments 7 and 10:** The Gateway West Transmission Line Project authorized approximately 1,000 miles of high-voltage transmission lines from Wyoming to Idaho. The project is jointly proposed by Idaho Power Company and PacifiCorp, doing business as Rocky Mountain Power. Segments 7 and 10 are newly authorized 500-kV lines near the Lava Ridge siting corridors. Segment 7 is located south of I-84 from the Populus Substation to the Midpoint Substation. Segment 10 is also a new 500-kV line from the Midpoint Substation to the Cedar Hill Substation and is partially co-located in the roughly north/south Section 368 corridor. The BLM authorized this ROW across public lands for these segments in 2018, and they are proposed for construction in 2028.
Wind and solar development	There are at least 170 existing wind turbines with a generating capacity of 280 MW within 30 miles of the project (Hoen et al. 2018 [version 6.1, released November 28, 2023]). The BLM Twin Falls District Office has received additional ROW applications for other wind and solar development projects. One of the proposed projects, Taurus Wind, would be immediately west of Lava Ridge (potentially within 1 mile) and is assumed for this analysis to be of a similar size and scale (1,500 MW), though a complete ROW application has not yet been received by the BLM. Another proposed wind project, Salmon Falls Wind Project (800 MW), would be located approximately 30 miles south of Lava Ridge. Three solar facilities are also proposed adjacent to the siting corridors. The Invenergy Gem Vale facility would cover approximately 3,500 acres on the east side of U.S. 93, just north of the Midpoint Substation. Two Longroad Energy facilities would cover a total of 6,800 acres (producing roughly a combined 1,000 MW) just east of U.S. 93 and south of (connecting to) the Midpoint Substation. All the solar facilities would have fencing surrounding the facilities. Additional renewable energy projects are expected throughout the west. EO 14008 (Tackling the Climate Crisis at Home and Abroad) set a renewable energy goal to provide 25 gigawatts (GW) of onshore renewable energy on DOI lands by 2025. Because of the existing electrical transmission infrastructure, known wind and solar resources, renewable energy goals, and projected trends for increased renewable energy demand (Idaho Power 2023; DOE 2008, 2021), it is reasonable that other renewable energy projects would be evaluated in the future on federal, state, and private lands in the district. Although there are few documented cumulative effects of multiple large-scale energy projects, the EIS assumes there would be some compounding or additive effect (depending on the resource) from multiple large-scale energy projects in close proximity to one another.
Irrigation canals	Three irrigation canals are near the Lava Ridge siting corridors: the Milner-Gooding Canal, Dietrich Main Canal, and North Side Main Canal. These canals are within existing ROWs on federal, state, and private lands.
Aquifer recharge sites and monitoring wells	The Idaho Water Resource Board manages several aquifer recharge sites on BLM public lands in and near the Lava Ridge siting corridors. One existing site, the Milepost 31 site, is approximately 335 acres and is north of the Milner-Gooding Canal. The Milepost 31 site partially overlaps the Lava Ridge siting corridors. In 2019, the BLM authorized two new sites, Milepost 29 and Wilson Canyon. Milepost 29 partially intersects the siting corridors, and Wilson Canyon is just outside the Lava Ridge siting corridors. The Milepost 29

Existing and Future Trends and Actions	Description
	site is approximately 645 acres and would be constructed adjacent to the Milepost 31 site. The Wilson Canyon site is 120 acres and is 8 miles south of the Milepost 29 site. There are also groundwater quality monitoring wells associated with all of the recharge sites.
Past vegetation treatments	The BLM has and will continue to implement vegetation treatments related to several aspects of land management, including hazardous fuels reduction, emergency stabilization and burned area rehabilitation (ESR), wildlife habitat improvements, and rangeland health on BLM public lands. These actions also include the BLM's integrated program of work (IPOW) and ESR treatments. Almost all of the BLM public lands near the siting corridors have been treated and continue to be treated. Many of the treatments overlap for various reasons; for example, seed preparation or timing of applications of seed types may overlap. Please see Section 3.7 (Fire and Fuels Management) for additional details.
Reseeding projects	The BLM has implemented and will continue to implement seeding for perennial grasses (and in some areas for sagebrush), including in some burn areas (BLM 2022). Species used in reseeding are selected due to their ability to establish readily in a difficult environment, provide deep-rooted structure, and compete against invasive annuals. These species (e.g., crested wheatgrass [Agropyron cristatum] or Siberian wheatgrass [Agropyron fragile]) were generally more productive grasses than the native bunchgrasses (such as Sandberg bluegrass [Poa secunda]). Areas that have been reseeded may now likely be dominated by grasslands (both native and nonnative).
Existing ROW authorizations	Existing types of ROW authorizations on BLM public lands include pipelines, roads, water infrastructure, communication sites, and power facilities. Existing ROWs include both linear and non-linear facilities.

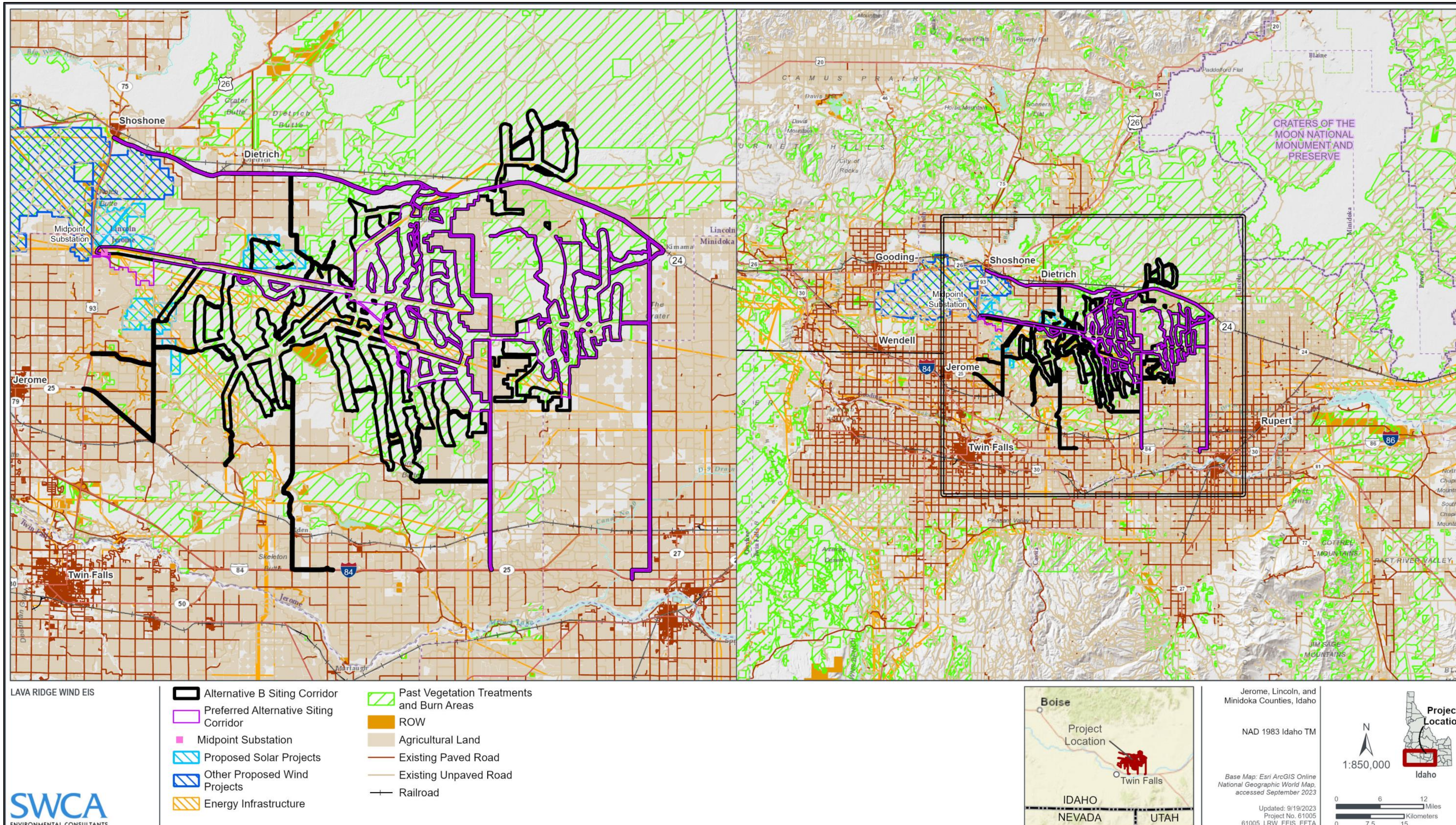

Figure 3.1-1. Existing and future trends and actions near the siting corridors.

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3.1.2 Analysis Approach

3.1.2.1 Mitigation

The project would be subject to applicant-committed measures, mitigation required by BLM policy, and additional project-specific mitigation as described in Section 2.3.4 (Avoidance and Minimization) and EIS Appendix 4. The EIS impact analyses assume the project would include implementation of these measures and discloses remaining impacts. To compensate for residual impacts, the BLM may also consider compensatory mitigation.

3.1.2.2 Tiering to the 2005 Programmatic Wind Environmental Impact Statement

This EIS tiers to the analysis in the BLM's *Final Programmatic Environmental Impact Statement for Wind Energy Development on BLM-Administered Lands in the Western United States* (2005a) and assumes the BMPs for wind energy development on BLM public lands (BLM 2005b) would be implemented. The effectiveness of these BMPs is analyzed in BLM (2005a), and the BMPs are included in Appendix A of the *Record of Decision – Implementation of a Wind Energy Development Program and Associated Land Use Plan Amendments* (BLM 2005b). BLM (2005a) identifies and discusses potential effects on various resources during construction, operation and maintenance, and decommissioning of a wind energy facility. Resources evaluated in this programmatic EIS include avian, bat, human health and safety, noise, recreation, vegetation, and wildlife. Although BLM (1986), as amended, was excluded from being amended by BLM (2005b), the ROD stated this could have been for a variety of reasons (BLM 2005b:B-2), including that developable wind resources were not deemed present in the area managed by the SFO at that time, or that BLM (1986) was expected to be amended in the near term (and thus analysis would be incorporated into BLM [1986]). Although SFO land management planning was not amended by BLM (2005b), the BLM (2005a) analysis includes the area managed by the SFO, and therefore some of the analysis (BLM 2005a) and the BLM (2005b) BMPs are relevant for the Lava Ridge Wind EIS. As appropriate, this EIS uses conclusions and BMPs from BLM (2005a) and BLM (2005b). As appropriate, this EIS uses conclusions and BMPs from BLM (2005a) and BLM (2005b). These are referenced in the issues analyzed in detail (Chapter 3) and in EIS Appendix 3. Potential site-specific impacts and impacts not disclosed in detail in BLM (2005a) are discussed in this EIS.

3.1.2.3 Siting Corridors

This EIS uses a corridor analysis approach to identify resources in the Lava Ridge siting corridors and to evaluate the impacts of the Proposed Action and alternatives. As described in Chapter 2, Section 2.3.1 (Project Location, Siting, Landownership, and Jurisdiction), preliminary project infrastructure and turbine locations are proposed in approximately 0.5-mile-wide siting corridors.

A preliminary representative project layout and disturbance footprints were used to develop a percentage of each corridor that would be disturbed during each phase of the project (construction, operation and maintenance, and decommissioning). The estimated acreages of disturbance associated with project components are presented in Chapter 2, Table 2.4-1 (Project Components by Action Alternative).

As described in Section 2.3.2 (Work Area and Infrastructure Disturbance), project disturbance is discussed throughout this EIS as either work area disturbance or infrastructure disturbance. Infrastructure disturbance includes the footprints of the project components, and these areas would remain disturbed from the beginning of construction through decommissioning of the wind energy facility. Work area disturbance is additional to the infrastructure disturbance, and these areas would be disturbed during the construction and decommissioning of the project. Disturbance could also occur in work areas for operation and maintenance activities through the life of the project; interim reclamation may occur in these areas throughout the life of the project.

Since the exact location of project components is not yet known, beyond being located within the siting corridors, the acreage of work area and infrastructure disturbances are proportionally applied to the siting corridors (i.e., as a percentage of each Chapter 3 resource affected by work area or infrastructure disturbance). This proportional approach estimates the total potential for resource disturbance within each corridor. Throughout the resource analyses presented in this chapter, the percentage of the siting corridors that would be subject to work area or infrastructure disturbance is used to determine the percentage of resources that could be affected by project work area and infrastructure disturbance across the siting corridors. For example, the total disturbance acreage represents 10% to 11% of the siting corridors, whereas the total infrastructure disturbance represents 3% of the siting corridors and the work area disturbance represents 7% to 8% of the siting corridors. Interim reclamation would occur following the construction phase in work areas (i.e., 7%–8% of the siting corridors); however, these areas could be re-disturbed for maintenance throughout the 30-year operation phase. Using this corridor analysis approach allows for consideration of the total potential disturbance, while accounting for the likely spatial distribution of project components and associated disturbances, and also provides flexibility for the final project layout following identification of resource constraints and site-specific engineering. This corridor analysis approach also allows for multiple final layouts to be evaluated within the siting corridors.

At the conclusion of the NEPA process, if an action alternative is selected, the final project layout would be approved by the BLM through a ROW and notice to proceed and would need to be consistent with the impacts disclosed in this corridor analysis and approved in the ROD. The siting corridors cross lands that are managed or owned by a variety of entities (see Section 3.8 [Land Use and Realty]); corridors are not solely on BLM public lands.

3.1.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Each impact analysis includes a description of the irreversible and irretrievable commitment of resources that would result from the project and an assessment of short-term uses versus long-term productivity. The following definitions are used in this analysis.

The *irreversible* commitment of a resource means that, once committed, the resource is permanently lost to other potential uses. An irreversible commitment generally applies to nonrenewable resources such as mineral resources, cultural resources, or geologic features, or to resources that are renewable over a very long period, such as soils and old-growth forests.

The *irretrievable* commitment of a resource means that, although committed, the resource can be renewed or restored following the action. For the project, irretrievable commitments apply to resources that would be lost to other potential uses during the life of the project, but whose commitments could be restored after decommissioning. For example, if at some point in the future, the access roads were reclaimed, this would be an irretrievable commitment of land uses because restoration would occur. Project decommissioning is described in the Project Decommissioning and Final Reclamation section in EIS Appendix 11.

As per 40 CFR 1502.16, the analysis includes a discussion of the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. All irreversible impacts would be long-term, and this analysis assumes they would remain post-project. Short term is defined as 6 years or less, assuming a construction phase of up to 3 years and 2 to 3 years until interim reclamation is deemed to have successfully met success criteria agreed to by the BLM and MVE.

3.2 AIR QUALITY

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.3 AVIAN AND BAT SPECIES

3.3.1 Bat Populations and Roosting Habitat

The issues analyzed in detail and the approach for the analysis are detailed in Table 3.3-1.

Table 3.3-1. Analysis Approach for Bat Populations and Roosting Habitat

Issue Analyzed in Detail	Issue 1: How would turbine operation affect bat populations? Issue 2: How would the project affect bat roosting habitat?
Associated Issues Analyzed in Brief	AIB-6: How would installation of tall structures (such as meteorological [met] towers) affect bat populations? AIB-7: Would an increase in human access to roosting habitat increase the risk for spread of white-nose syndrome? AIB-8: How would the project affect bat foraging habitat?
Analysis Area	Issue 1: EPA North American Deserts Level I Ecoregion (Figure 3.3-1). Ecoregions provide natural and hierarchical classifications of spatial regions based on meaningful ecological characteristics, underlying ecological communities, and geographic space. Thus, they provide an ecological approach to capturing regional variation in bat occupancy (Udell et al. 2022). Ecoregions also provide useful spatial units over which to model changes in population, as opposed to modeling changes in population as constant across a species range. Data on bat fatality rates and installed wind capacity are also available at the ecoregion level, which allows for a more informed estimation of the bat fatality rate that could be expected under the action alternatives, and the relative contribution of those fatalities to the overall impact on regional bat populations. Issue 2: The siting corridors (Figure 3.3-2). The analysis also discusses areas outside the siting corridors that contain roosting or other habitat features that may concentrate bat use adjacent to or across the siting corridors (such as water resources) and that may contribute to fatality risk.
Indicators	Issue 1: • Fatality estimates based on generation capacity and bat mortality monitoring data from existing wind energy facilities in the analysis area. • Qualitative assessment of the placement and number of turbines near areas of concentrated bat activity or in potential foraging routes. Issue 2: • Mapped suitable roosting and potential roosting habitat that may be disturbed by infrastructure or work areas.
Impacts Duration	Issue 1: The 30-year operation phase. Issue 2: The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and final reclamation (50 years, the longest estimated time for native vegetation communities to reestablish, as described in Section 3.15.1 [Native Upland Vegetation Communities] in EIS Appendix 15).
Data Sources	MVE's bat acoustic monitoring surveys to identify species in the analysis area and locations of suitable roosting habitat (Western EcoSystems Technology, Inc. [WEST] 2021a, 2021b, 2022a). MVE's review of bat fatality data from existing wind facilities (WEST 2021c).
Assumptions or Approach	Fatality estimates for the project are based on the fatality rates observed at other wind facilities in the EPA North American Deserts Level I Ecoregion, and the fatality rate for the project would fall within the range observed at other wind energy facilities in this region. Fatality rates are not intended to be precise predictions but are presented to allow for a meaningful comparison between the alternatives. Although the project acoustic monitoring surveys (WEST 2021a, 2022a) help inform which species occur in and near the siting corridors and the timing of peak bat activity, preconstruction acoustic activity does not appear to be correlated with observed bat fatality rates following construction (Arnett et al. 2015; Solick et al. 2020). The risk of fatalities from turbine collisions also varies among species due to factors such as flight characteristics, foraging behavior, and habitat use (American Wind Wildlife Institute [AWWI] 2018). Thus, the species composition of fatalities observed at other United States wind facilities was considered when determining the potential for each species to collide with operational turbines. The magnitude of the effect of fatalities from turbine collisions on regional bat populations would be the same regardless of where those fatalities occur within the analysis area (EPA North American Deserts Level I Ecoregion). Therefore, the effects of the project on regional bat populations would be directly proportional to the number of fatalities that occur as a result of the project. Although this may be an oversimplification for some species, genetic studies have found that most bats have large, well-mixed populations (Baerwald et al. 2014; Cornman et al. 2021), and accurately characterizing smaller subpopulations of bats is not possible with the data currently available.

Figure 3.3-1. Bat populations analysis area.

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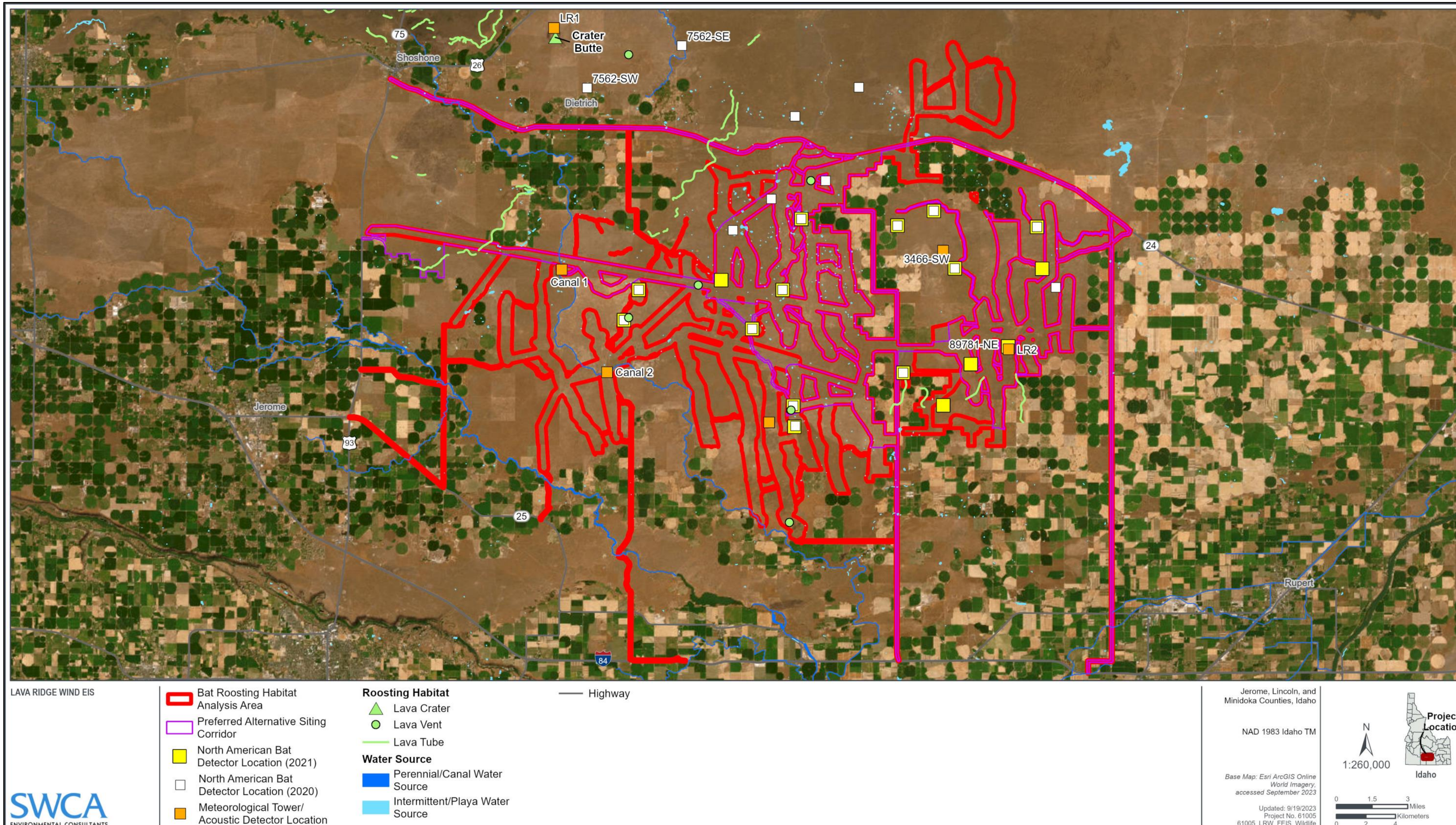

Figure 3.3-2. Bat roosting habitat analysis area.

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3.3.1.1 Affected Environment[6]

3.3.1.1.1 BAT ROOSTING HABITAT

MVE assessed the potential for previously identified potential bat roosts to be used as maternity (summer), migratory stopover (spring and fall), or hibernacula (winter) sites (WEST 2021b). The assessment included four caves, four lava tubes, six lava vents, and a lava crater.

The lava vents visited during the bat roosting features assessment (WEST 2021b) had no noticeable aboveground features on the landscape and thus were unlikely to be used as bat features. Most of the lava tubes assessed had rocky outcrops or rock piles that also have low potential to be used for day roosting, but could provide suitable night roosts. The lava crater may provide suitable habitat as a migratory stopover, and cracks and fissures may be suitable for summer maternity season use by *Myotis* species (WEST 2021b). None of the caves meet the quantitative criteria for disqualification as potential hibernacula or maternity roosts, though no bats or signs of bats (i.e., guano, staining, audible bat calls) were observed at any cave entrance. Kimama Wind Cave and Wilson Butte Cave contained signs of extensive human disturbance (such as trash, fire rings, graffiti) and would unlikely be important maternity, migration, or maternity roosts. Of the two unnamed caves, only one (the unnamed cave in the analysis area) may provide suitable migratory stopover habitat. Neither cave is likely to be an important maternity, migration, or maternity roost (WEST 2021b). Acoustic monitoring near both unnamed caves in July and August 2021 revealed relatively low bat use near these caves, confirming they are unlikely to be important roost sites. The single lava crater (Crater Butte) included in the assessment is north of Dietrich, Idaho, to the northwest of the analysis area and had the highest potential to be used as a roost site.

Although none of the potential bat roosting features included in the 2020 assessment are likely to be major roosting locations for resident or migratory bats, other suitable roosting habitat is likely present in the analysis area and may include structures, piles of lava rock, cracks and crevices in rock outcrops, caves, and trees. One U.S. Geological Survey (USGS) North American bat dataset (NABat) station (89781-NE; see Figure 3.3-2) included in the 2021 acoustic monitoring surveys, which is located near a small lava crater that sits between two siting corridors, recorded far higher use (81.05 ± 14.65 bat passes per detector-night) than any other station monitored, and peaks in call activity shortly after sunset and before sunrise confirm this site is used for roosting.

Although not visited as part of the bat roosting feature assessment (WEST 2021b), there is a high concentration of volcanic features, such as lava tubes, vents, craters, and caves that provide roosting habitat for a variety of bat species, throughout the SFO planning area and at CRMO, which is less than 10 miles northeast of the siting corridors. Townsend's big-eared bat (*Corynorhinus townsendii*) is the most commonly recorded species at CRMO, and most (64%) known maternity roosts for the species in Idaho are within CRMO; western small-footed bat (*Myotis ciliolabrum*) is the second-most common bat in hibernacula at CRMO (Stefanic 2021). All but five of the bat species listed in Table 3.3-2 have been recorded in CRMO. One species, canyon bat (*Parastrellus hesperus*), is included on the list from CRMO, but occurrence is limited to an unconfirmed record from the Wapi lava flow. CRMO is within the range of the remaining four bat species without occurrence records (Stefanic 2021). Since CRMO is less than 10 miles from the siting corridors and contains extensive roosting habitat, and because it has recorded occurrences of many of the same species that were recorded in and near the analysis area, it is possible that bats roosting at the park may move between the analysis area and CRMO during foraging or seasonal migrations.

[6] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

3.3.1.1.2 BAT POPULATIONS

Seventeen bat species have been documented in Idaho (Table 3.3-2), and all have the potential to occur in the analysis area based on known distributions and presence of suitable habitat. Acoustic monitoring detected calls from 13 bat species (identified in Table 3.3-2 as *detected during survey*), including one species not expected to occur in Idaho (WEST 2021a, 2022a).

Table 3.3-2. Idaho Bat Species and Potential to Occur in the Siting Corridors

Common Name	Scientific Name	Status*	Potential for Occurrence	Season of Use (peak in bold font)	Call Frequency (Kilohertz)
Big brown bat	*Eptesicus fuscus*	S SGIN	Detected during survey	Summer, **fall**	15–30
Big free-tailed bat[†]	*Nyctinomops macrotis*	None	Detected during survey	Accidental	< 15
California bat	*Myotis californicus*	None	Detected during survey	Summer	> 30
Canyon bat	*Parastrellus hesperus*	S SGIN	Detected during survey	Fall	> 30
Fringed bat	*Myotis thysanodes*	SGIN	Detected during survey	Fall	15–30
Hoary bat	*Lasiurus cinereus*	S SGCN	Detected during survey	Summer, **fall**	15–30
Little brown bat[‡]	*Myotis lucifugus*	S SGCN	Detected during survey	Summer, **fall**	> 30
Long-legged bat	*Myotis volans*	S SGIN	Detected during survey	Summer	> 30
Mexican free-tailed bat	*Tadarida brasiliensis*	None	May occur	Unknown	
Pallid bat	*Antrozous pallidus*	S SGIN	Detected during survey	Fall	15–30
Silver-haired bat	*Lasionycteris noctivagans*	S SGCN	Detected during survey	Summer, **fall**	15–30
Spotted bat	*Euderma maculatum*	SGIN	May occur	Unknown	< 15
Townsend's big-eared bat	*Corynorhinus townsendii*	S SGCN	Detected during survey	Summer, fall	15–30
Western long-eared bat	*Myotis evotis*	S	May occur	Unknown	> 30
Western red bat	*Lasiurus blossevillii*	None	May occur	Unknown	
Western small-footed bat	*Myotis ciliolabrum*	S	Detected during survey	Summer, **fall**	> 30
Yuma bat	*Myotis yumanensis*	S SGCN	Detected during survey	Summer, fall	> 30

Sources: Stefanic (2021); WEST (2021a, 2022a).

* S = BLM SFO special-status species; SGCN = species of greatest conservation need; SGIN = species of greatest information need.

[†] This species was not documented in Idaho before the 2020 acoustic monitoring surveys (WEST 2021a). It is not listed as a BLM special-status species in Idaho, but it is listed as a BLM special-status species in Utah.

[‡] The USFWS is currently conducting a status review for this species, and it could become listed under the ESA in the near future.

Bat Use in the Siting Corridors

Hoary bat (*Lasiurus cinereus*) accounted for most of the bat activity (for which a species could be identified) recorded during the 2020 bat acoustic monitoring surveys (WEST 2021a), followed by silver-haired bat (*Lasionycteris noctivagans*) and western small-footed bat. Townsend's big-eared bat, little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), Yuma bat (*Myotis yumanensis*), and fringed bat (*Myotis thysanodes*) were also observed. Most bat passes could not be identified to species level, and most bat activity was recorded as unidentified *Myotis* species, recorded at the ground stations (WEST 2021a). At the two long-term acoustic stations, overall activity was higher at the ground stations than at the raised stations, and although species composition was similar, bats with low-frequency calls made up a greater proportion of detections at the raised stations than at the ground stations.

Bat activity varied substantially among seasons, with low activity in the spring (April 13–May 14) and summer (May 15–August 15) and high activity in the fall (August 16–November 1). Overall, activity by bats with high-frequency calls (i.e., most *Myotis* species) was higher in the summer than in the fall, whereas activity by bats with low-frequency calls was highest in the fall. Hoary bat activity peaked in late August, silver-haired bats were detected from spring through summer and were the last species identified in the area in October, and Townsend's big-eared bats were detected sporadically throughout the monitoring period. Three bat species were recorded only during the fall migratory season: little brown bat, fringed bat, and big free-tailed bat.

Western small-footed bat was the most recorded bat species during the 2021 acoustic monitoring surveys (73.7% of passes at project acoustic monitoring stations and 1.4% of passes at NABat stations), though this is likely due to improved ability to differentiate between calls of *Myotis* species (WEST 2022a), and it is possible that this species was also the most abundant during the 2020 bat acoustic monitoring surveys given that most calls recorded in 2020 were labeled as unidentified *Myotis*. Most (80%) of the western small-footed bat activity was recorded at the NABat station 89781-NE (near the lava crater roost site). Hoary bat and silver-haired bat detections remained common during the 2021 surveys, and all of the species recorded in 2020 were also detected in 2021 with the exception of big free-tailed bat. Four new species were detected in 2021 that were not recorded in 2020: California bat (*Myotis californicus*), canyon bat, long-legged bat (*Myotis volans*), and pallid bat (*Antrozous pallidus*).

The 2020 bat acoustic monitoring surveys identified more bat passes and higher species diversity at survey stations with the largest and highest quality water resources (WEST 2021a). Most of the bat detections occurred at the two NABat stations along an irrigation channel, and the next acoustic monitoring station with the highest activity (3466-SW) is adjacent to a stock pond. All three of these NABat stations are approximately 2 miles outside the analysis area (see Figure 3.3-2). NABat stations adjacent to stagnant or algae-covered stock ponds recorded less activity. During the second year of project acoustic monitoring surveys, much higher bat activity was recorded at the acoustic monitoring stations installed near the irrigation canals in the siting corridors than at monitoring stations installed near cave features (see Figure 3.3-2), confirming that concentrated foraging activity occurs along the canals (WEST 2022a). Overall, the data from the acoustic monitoring surveys indicate that bats are attracted to prominent flat water and rock features within the siting corridors, which is expected given the limited number of water resources within the siting corridors (WEST 2022a).

Although water features may concentrate bat activity, bats travel from day roosts to foraging areas each night over distances of up to 12 miles (and up to 26 miles in rare instances [Siders et al. 1999]), and some species may make several round-trip flights in a single night. Collisions may occur with turbines located anywhere in their nightly flight path, and postconstruction monitoring usually reveals consistent fatality rates at all turbines across a facility, even when features that concentrate bat activity are present (Hein and Schirmacher 2016). Migratory tree bat fatalities are consistently higher during the fall migratory period

(WEST 2021c), suggesting their risk of collision with turbines is even less influenced by the proximity of turbines to foraging resources. High bat use has been documented at the irrigation canals toward the western limits of the siting corridors and at presumed roosting features toward the far eastern limits of the siting corridors (WEST 2022a), which are separated by a distance of less than 15 miles, suggesting that bats may cross the siting corridors multiple times each night when travelling between roost sites and foraging areas. Although other potential foraging routes have not been identified, bats using the lava crater roost site and other roosting features in or near the siting corridors may be exposed to turbines and other project infrastructure during foraging flights.

Summer occupancy maps for all five of these species clearly show that bat occupancy in the Snake River Plain is substantially lower than surrounding areas. This is consistent with the low bat activity observed during summer acoustic monitoring surveys (WEST 2021a, 2022a). Winter abundance maps are not yet available, and occupancy during migration is not included in the study. The pronounced peak in bat activity during the fall migratory season recorded during project acoustic monitoring surveys indicates that bats have the potential to pass through the siting corridors in large numbers, even if little bat use is occurring during the summer and winter (when bats would be hibernating).

Species Analyzed in Detail

As described in EIS Appendix 9, there are substantial limitations to quantitatively assessing impacts to bat populations, given the sensitivity of bat populations to increased mortality and the large number of fatalities that have been observed at existing wind energy facilities. However, it is widely accepted that turbine collisions have the potential to cause major declines in the populations of some bat species (AWWI 2018; Frick et al. 2017; Hein and Schirmacher 2016; Hein et al. 2021; Zimmerling and Francis 2016). Species with small, declining populations may be vulnerable to small increases in mortality as a result of collisions with turbines. Species with larger, more stable populations may also be vulnerable to population declines if very high fatality rates from turbine collisions are sustained over a long time period. Each of the bat species with the potential to occur in the siting corridors (see Table 3.3-2) was evaluated for its likelihood of colliding with turbines and the potential for those fatalities to lead to population-level effects. Twelve of these species were determined to have a low likelihood of population-level effects. Though effects to these 12 species may occur (EIS Appendix 3), none of these species would be expected to experience a readily detectable population decline in the analysis area. The five species (big brown bat, little brown bat, western small-footed bat, hoary bat, and silver-haired bat) that were determined to have a moderate to high potential for population-level effects are described in detail below. Cave-hibernating bats are addressed separately from migratory tree bats because the risk factors for each group are notably different.

Cave-Hibernating Bats

Although caves in the siting corridors do not appear to be suitable for use as hibernacula (WEST 2021c), other lava features and rock piles or outcrops in the siting corridors could be used as hibernacula by small numbers of bats.

BIG BROWN BAT

The big brown bat is a BLM special-status species for the SFO (see Table 3.3-2), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the Endangered Species Act (ESA). Although big brown bats are relatively common across their geographic range, reliable estimates of population size and trend are lacking (Allison 2018; Hayes and Wiles 2013; Schmidly and Bradley 2016).

Three big brown bat passes were recorded at the LR1 ground-level detector (see Figure 3.3-2) during the first year of acoustic monitoring surveys; one pass was detected in early July and the other two passes were detected in late August and early September (WEST 2021a). During the second year of acoustic monitoring, several big brown bat passes were recorded at the irrigation canals and at NABat stations in and adjacent to the siting corridors; use was similar in summer and fall (WEST 2022a).

LITTLE BROWN BAT

The little brown bat is an Idaho SGCN and a BLM special-status species for the SFO (see Table 3.3-2), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the ESA. The USFWS has already initiated a range-wide status review for the little brown bat (USFWS 2022), and the species could become listed under the ESA in the near future. Impacts from WNS and wind energy are the primary factors contributing to the species consideration for ESA listing (Nolfi 2024).

All five little brown bat passes recorded during the first year of acoustic monitoring surveys occurred at the LR2 ground-level detector near Kimama Cave (see Figure 3.3-2) during the 2-week period between September 10 and September 23 (WEST 2021a). However, most *Myotis* calls could not be reasonably identified to the species level during the first year of acoustic monitoring surveys. Unidentified *Myotis* species accounted for most of the bat activity recorded during the first year of surveys and was recorded in every season but peaked between early August and mid-September (WEST 2021a). Most unidentified *Myotis* activity was recorded at the ground-level detectors (WEST 2021a). Little brown bats were recorded much more frequently during the second year of project acoustic monitoring surveys. The species accounted for nearly 5% of all calls for which a species could be identified at the NABat stations, and 0.5% of all calls for which a species could be identified at the project acoustic monitoring stations, though this could be due in part to improved ability to differentiate *Myotis* calls to the species level (WEST 2022a). Little brown bat activity during the 2021 surveys was higher in fall than summer and occurred almost entirely at the canal stations.

WESTERN SMALL-FOOTED BAT

The western small-footed bat is a BLM special-status species for the SFO (see Table 3.3-2), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the ESA.

The western small-footed bat was recorded during both years of acoustic monitoring surveys and was the most active species at the lava crater roost site (WEST 2021a, 2022a), which accounted for approximately 80% of western small-footed activity recorded in 2021. Although very few western small-footed bat passes were recorded during the first year of surveys, the species accounted for nearly 74% of the passes that could be identified to the species level during the second year. This is likely due to improvements in the ability to differentiate *Myotis* calls to the species level during the second year (WEST 2022a), and the species likely accounts for most of the activity recorded during summer in the first year of surveys (which was predominantly unidentified *Myotis* species).

Migratory Tree Bats

Migratory tree bats such as hoary bat and silver-haired bat roost in the foliage of trees and engage in long-distance seasonal migrations. Rock crevices, caves, lava features, and humanmade structures may also be used for roosting.

Postconstruction monitoring at existing U.S. wind facilities indicates that migratory tree bats account for most (72%) of the bat fatalities from collisions with turbines (AWWI 2018; Peters et al. 2020). The expansion of wind energy in the United States and Canada is considered a major threat to both species (Bat Conservation International [BCI] 2021; BLM 2005).

Both the hoary bat and the silver-haired bat are BLM special-status species for the SFO and are Idaho SGCNs (see Table 3.3-2), which indicate management intervention will likely be necessary to prevent long-term declines in these species and to prevent a trend toward federal listing under the ESA. The USFWS plans to review the hoary bat for potential ESA listing in fiscal year 2027 (USFWS 2023).

HOARY BAT

Some studies have found evidence of regional hoary bat population declines (Rodhouse et al. 2019), and a study of fatalities recorded at 594 turbines in Ontario, Canada, over 7 years reported large declines (> 68%) in hoary bat carcass detections that could not be attributed to avoidance alone (Davy et al. 2020). Modeling has shown that the hoary bat fatality rates documented at existing U.S. wind energy facilities are high enough to cause severe population declines and increase the risk of extinction, even if the current population was much larger than estimated (Frick et al. 2017; Friedenberg and Frick 2021). At the most widely accepted estimate of 2.5 million bats, the hoary bat population would be expected to decline by as much as 90% over the next 50 years as a result of fatalities at wind energy facilities, and could be reduced by half as soon as 2028. It is unlikely that hoary bats would be capable of increasing their population's growth rate enough to prevent population declines (Frick et al. 2017). However, these findings did not take into account the effect of minimization measures (such as curtailment or acoustic deterrents) that could be implemented to reduce bat fatalities. Building on this work, additional modeling revealed that hoary bat fatality rates at wind energy facilities would need to be reduced by 78% to lower the probability of extinction for the species by 2050 to less than 1% (Weaver et al. 2020).

Hoary bats accounted for most of the bat activity recorded during the first year of acoustic monitoring surveys for which a species could be identified (WEST 2021a), and the results showed virtually no difference between hoary bat activity at ground-level detectors and raised detectors within the RSH. Hoary bats were detected from late April through mid-October but showed a pronounced peak in activity in mid-August, which corresponds to the fall migratory period for the species (WEST 2021a). Hoary bats were the second-most recorded bat species during the 2021 surveys, accounting for 2.3% of all calls for which a species could be identified at the NABat stations and 21.3% of all calls for which a species could be identified at the project acoustic monitoring stations (WEST 2022a). Hoary bat activity was much higher in August than in July and was recorded at all NABat and project acoustic monitoring stations, but was higher at the canal stations and NABat stations near stock ponds (WEST 2022a).

SILVER-HAIRED BAT

Silver-haired bat activity recorded during the first year of acoustic monitoring surveys (WEST 2021a) was the second highest of all bats but was considerably lower than hoary bat activity (21 passes in comparison to 153 passes). As with hoary bat, activity at ground-level and raised detectors within the RSH was similar. Silver-haired bats were recorded from early May through late October and were detected later in the fall than any other species. Silver-haired bat activity peaked in early September during the fall migratory period for the species (WEST 2021a). Silver-haired bats were the third-most recorded species during the second year of project acoustic monitoring accounting for 1.8% of all calls for which a species could be identified at the NABat stations and 0.3% of all calls for which a species could be identified at the project acoustic monitoring stations (WEST 2022a). Use was slightly higher at the canal stations as compared to the cave stations, but it was not higher at NABat stations near stock ponds.

3.3.1.1.3 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence bat populations and habitat in the analysis area through habitat alteration and through conversion of open space to agriculture or rural residential. Disturbance to and loss of hibernacula and other roost sites has impacted cave-hibernating bats in particular. Agricultural lands may provide water sources for bats. Several livestock grazing allotments are present in the siting corridors, which often contain humanmade water sources that may be used by bats.

There are 11,137 existing wind turbines in Canada and the United States within the analysis area for bats with a combined capacity of 16,090 MW (Hoen et al. 2018 [version 6.1, released November 28, 2023]; Natural Resources Canada 2022). As of 2019, the total installed wind energy capacity in Mexico was approximately 6,500 MW (Wood Mackenzie 2020). Though it was not possible at the time of writing this EIS to determine how much of this capacity is installed in the analysis area, most of the wind energy potential in Mexico is in the Oaxaca region south of the analysis area. Thus, most existing facilities are located in Oaxaca, and most future development is also expected to occur there (Aleman-Nava et al. 2014). Portions of the Baja Peninsula in the analysis area have high wind potential, but as of 2020, there were only 197 MW of installed capacity in Baja California (Andrade et al. 2020). Although accurately estimating the amount of new wind generation capacity that will be brought online in the analysis area over the next 30 years is not possible, thousands of megawatts of new wind generation capacity would be needed to meet state and federal renewable energy goals, including the DOI’s goal to permit 25 GW of onshore renewable energy on DOI lands by 2025 (EO 14008). A large portion of BLM public land that is economically developable for wind energy (as modeled by the National Renewable Energy Laboratory) is in the analysis area (BLM 2005); thus, it is likely that wind energy facilities will rapidly expand in the analysis area over the next 30 years. The rapid development of wind energy facilities across the United States is a major contributor to the decline of several migratory tree bat species (AWWI 2018; BCI 2021; Frick et al. 2017; Hein et al. 2021), and wind development in the analysis area will have a substantial contribution to the overall impact on their populations. Wind energy is likely to continue expanding in Canada and Mexico over the next 30 years as well, but installed capacity in the portion of these countries in the analysis area is likely to remain small in comparison to installed capacity in the U.S. portion of the analysis area (mainly due to wind energy potential). Given this, cumulative impacts would primarily be related to U.S. wind energy development, especially for species that do not migrate long distances.

At least two other wind energy facilities are planned near the Lava Ridge Wind Project: the Taurus Wind Project, which would be immediately northwest of the Lava Ridge Wind Project, and the Salmon Falls Wind Project, which would be approximately 30 miles south. The Taurus Wind Project would be similar in size and scale to the Lava Ridge Wind Project (estimated capacity of 1,500 MW), and the Salmon Falls Wind Project would be smaller (estimated capacity of 800 MW). Though it is impossible to accurately predict the bat fatality rate from these facilities, the cumulative impacts of numerous facilities with high fatality rates across the landscape could compound the impacts on bat populations. The potential effect of the expansion of wind energy on bat populations in the analysis area would depend on several site-specific variables at each project location, the number and size of turbines that would be used, and the implementation and effectiveness of mitigation measures to reduce impacts to bats. Additionally, where federal permitting and law do not apply (e.g., on state or private lands), identification of bat populations might not occur, and impacts might go unmitigated.

As discussed above, the spread of WNS has led to precipitous declines in the populations of many cave-hibernating bat species, though these effects have been primarily limited to populations in the northeastern United States and southeastern Canada (Cheng et al. 2021). However, WNS has continued to expand westward and has recently been detected at sites in the Intermountain West (i.e., Montana, Wyoming, Colorado, and New Mexico) and Pacific Northwest. The fungus that causes WNS has been detected in southeastern Idaho, but there are no confirmed cases of WNS in Idaho (White-nose Syndrome Response Team 2022b). Although it is difficult to predict with certainty how cave-hibernating bat populations in the western United States will respond to the continued spread of WNS, it is considered to be a moderate threat to big brown bats and a high threat to little brown bats (Cheng et al. 2021). Migratory tree bats and other bats that do not hibernate are unlikely to experience effects from WNS; the fungus that causes WNS has been detected on several of these species, but they have not developed WNS as a result (White-nose Syndrome Response Team 2022a).

3.3.1.2 Impacts

3.3.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and bat populations and roosting habitat would only be affected by existing and future trends and actions.

3.3.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Effects to Bat Roosting Habitat

The project would directly affect bat roosting habitat through habitat alteration and habitat loss from work areas and infrastructure. Bats often roost on structures where anthropogenic noise is high (e.g., highway bridges and underpasses), and roosting bats have shown low sensitivity to anthropogenic noises and the ability to quickly adapt to new sources of noise (Keeley and Tuttle 1999; Luo et al. 2014). Therefore, noise during construction and operation is unlikely to notably impact the quality of bat roosting habitat in the siting corridors.

None of the lava tubes or vents surveyed in the analysis area had openings or fissures that would allow access by bats. The single cave in the analysis area is a small, narrow, muddy shaft that is unlikely to be suitable as a maternity or winter roost, and acoustic monitoring indicated bat use near this feature is low (WEST 2021b, 2022a). Although this small cave and some of the rock piles scattered through the analysis area may provide limited migratory stopover roosting sites, it is unlikely that most of these features concentrate bat activity (WEST 2021b). Roosting has been documented at the lava crater near NABat station 89781-NE in the siting corridors and could be disturbed under Alternative B.

Although the potential bat roosting features identified in the analysis area (with the exception of the lava crater described above) appear to lack the necessary features to support significant roosting activity of any type, Alternative B would have more ground disturbance near these features than the other action alternatives. Since Alternative B would have the largest ground disturbance footprint, it could have the largest impact to other potential bat roosting habitat (such as rock piles and trees, though these are limited in the siting corridors) in the analysis area. It is not known whether bats use these other features extensively in the analysis area, or if they roost in other suitable habitat outside the analysis area (at CRMO, for example) and travel to the siting corridors to forage. Therefore, it is difficult to determine the magnitude of impacts to bat roosting habitat; however, given the relative lack of roosting features in the analysis area in comparison to the surrounding landscape, the potential for significant impacts is low.

Effects to Bat Populations

The project would affect bat populations through injury or mortality due to collision with turbine blades.

BLM (2005) identifies and discusses potential effects to bat populations from turbine operation (2005:5-64–5-71) and concludes that the fatality rates observed at existing wind energy facilities in the western

United States (1 to 2 bat fatalities per turbine per year) are unlikely to lead to population declines near these facilities. However, wind energy has expanded in the years since 2005, and recent studies on the effect of turbine collisions on migratory bats indicate that population-level impacts could occur due to sustained mortalities from collisions with turbines during migratory movements. Much higher fatality rates have been observed at wind energy facilities in the eastern United States, and collision with wind energy turbines is one of the leading causes of bat fatalities in North America (BCI 2021; BLM 2005). Bat fatalities from barotrauma (due to rapid changes in air pressure near spinning turbine blades) have been documented, but there is little evidence to suggest that this is an important source of mortality at wind energy facilities (AWWI 2016; Lawson et al. 2020). Regardless of whether mortalities are caused by collisions or barotrauma, reducing bat fatalities at wind energy facilities can only be accomplished by reducing interactions between bats and operational turbines (Guest and Hein 2023). Therefore, this section focuses on the potential effects of turbine collisions on bat populations and incorporates the results of additional studies that have occurred since the publication of BLM (2005). Bats rarely collide with stationary structures such as buildings and met towers (Hein and Schirmacher 2016; Zimmerling and Francis 2016); thus, those are not analyzed in detail (see AIB-6 in EIS Appendix 3).

Fatality Rates

Recent data collected during postconstruction monitoring at wind energy facilities (Allison and Butryn 2020; WEST 2019, 2021c) have produced a wider range of bat fatality rate estimates than were reported in BLM (2005), from less than 1 fatality per turbine per year to as many as 16 fatalities per turbine per year; two-thirds of these projects reported less than 8 fatalities per turbine per year (BLM 2005; WEST 2021c). The higher fatality rates at more recently constructed facilities suggest that the shift toward larger turbines is increasing the risk of collision for bats (Barclay et al. 2007; Hein and Schirmacher 2016), in part because larger turbines operate at lower wind speeds when bats are most active. However, uncertainty in the relationship between turbine characteristics and bat fatality rates remains (AWWI 2016). Electric Power Research Institute (2020a) found that bat fatality rates peaked at turbines with a hub height of 80 meters and a rotor-swept area of approximately 8,000 square meters. However, overall, bat fatality rates were weakly correlated with turbine size variables (i.e., hub height, blade length, and rotor-swept area) (Electric Power Research Institute 2020a). Turbine lighting does not appear to affect the likelihood of collision for bats (Arnett et al. 2007; AWWI 2016; Gehring 2011).

Partly because of the differences in turbine height and other turbine characteristics, most recent studies report fatality rates in terms of fatalities per MW per year (rather than per turbine per year). Allison (2018) reports median fatality rates near 3 fatalities per MW per year across the entire United States, with much lower rates for the USFWS Pacific Region (Oregon, Washington, and Idaho; see Figure 3.3-1) alone (0.7 fatalities per MW per year). The median fatality rate for the United States remained unchanged in Allison and Butryn (2020), with the median fatality rate for the USFWS Pacific Region remaining lower than any other region (0.69 fatalities per MW per year). However, caution is warranted when comparing fatality rates between regions because of the non-random nature of the samples and the lack of consistency in survey methodology and search effort (Allison and Butryn 2020). Although bat fatality rates at wind energy facilities in the western United States appear to be lower on average than at facilities in the eastern United States (Allison and Butryn 2020), adjusted fatality rates as high as 50 bat fatalities per MW per year have been reported at facilities in the eastern United States (WEST 2021c). Additionally, it is unknown which wind energy facilities were deploying curtailment strategies.

To provide context and to identify geographic variation in bat fatality rates at wind energy facilities, the project's bat mortality analysis (WEST 2021c) summarizes data from postconstruction monitoring at wind energy facilities at several different spatial scales: the United States as a whole, the USFWS Pacific Region, and the EPA North American Deserts Level I Ecoregion (see Figure 3.3-1). WEST (2021c) describes fatality rates between 0.08 and 7.40 fatalities per MW per year at existing wind energy facilities in the USFWS Pacific Region, with similar bat fatality rates reported for the EPA North American Deserts Level I Ecoregion (0.00–7.40 bat fatalities per MW per year). The mean bat fatality rate in both regions was approximately 1.5 bat fatalities per MW per year. This is also consistent with the mean fatality rate for the USFWS Pacific Region (1.11 bat fatalities per MW per year) reported in Allison and Butryn (2020).

Fatality rates for Idaho reported in WEST (2021c) are based on a single facility (Horse Butte Wind) (see Table 3.3-3). Data were obtained for three other existing wind energy facilities in Idaho: Power County Wind (Hallingstad et al. 2013), Rockland Wind (Tetra Tech 2015), and Meadow Creek Wind (Tetra Tech 2014) (see Table 3.3-3). The postconstruction fatality monitoring conducted for these three facilities did not follow standard methodology, and the results cannot be compared directly with the data from WEST (2021c). For example, a non-random subset of turbines located near the highest quality habitat at the Meadow Creek Wind facility was monitored, and data were only collected during the first year of operation. Data for the Power County Wind facility only cover a 6-month period from April through October 2012. The report for the Rockland Wind facility covers the first 3 years of operations but only uses data collected during a 10-week window each year (July 16 through September 30).

Table 3.3-3. Bat Fatality Rates for Existing Wind Energy Facilities in Idaho

Facility Name and Generation Capacity	Location and Distance from Siting Corridors	Study Period	Bat Fatality Rate	Estimated Annual Bat Fatalities	Data Limitations and Notes on Fatality Rates
Horse Butte Wind 57.6 MW	Idaho Falls, Idaho 110 miles northeast	September 27, 2012–September 12, 2013	7.80 fatalities/MW/year	449	None. Study followed standard protocols and is included in databases.
		September 25, 2013–September 24, 2014	9.27 fatalities/MW/year	534	None. Study followed standard protocols and is included in databases.
		October 1, 2014–September 23, 2015	5.12 fatalities/MW/year	295	None. Study followed standard protocols and is included in databases.
Meadow Creek Wind 120 MW	Idaho Falls, Idaho 110 miles northeast	April 2, 2013–March 31, 2014	15.80 fatalities/MW/year	1,896	Data collected from a non-random sample of turbines near the highest quality habitat at the project. All turbines are within 0.5–3.5 miles of a large reservoir with extensive cliff habitat for roosting bats. Only 1 year of data collected.
Power County Wind 45 MW	American Falls, Idaho 55 miles east	April 19, 2012–October 31, 2013	2.17 fatalities/MW/year	98	Only 6 months of data collected; targeted fall bat migration.
Rockland Wind 79.2 MW	American Falls, Idaho 45 miles east	July 16, 2012–September 30, 2012	3.91 fatalities/MW/year	310	Data only collected during a 10-week focal window for peak bat migration. Bi-weekly search interval led to large confidence interval (i.e., uncertainty) in bat fatality rate.
		July 16, 2013–September 30, 2013	1.47 fatalities/MW/year	116	Data only collected during a 10-week focal window for peak bat migration. Changed to weekly searches to increase confidence in results.
		July 16, 2014–September 30, 2014	1.74 fatalities/MW/year	138	Data only collected during a 10-week focal window for peak bat migration. Continued with weekly search interval.

Sources: Hallingstad et al. (2013); SWCA (2015); Tetra Tech (2014, 2015).

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Rockland Wind and Power County Wind are the closest wind facilities to the siting corridors. They are in a similar sagebrush steppe habitat but are in more rugged terrain associated with the foothills of the Bannock Range. Rockland Wind has turbines within 7 miles of the Snake River, and Power County Wind has turbines as little as 1 mile from the Snake River (Hallingstad et al. 2013; Tetra Tech 2015).

Horse Butte Wind and Meadow Creek Wind are immediately adjacent to each other and sit in a large bend in the Snake River, which is approximately 9 miles east and west of the facilities. The habitat at these facilities is primarily sagebrush steppe, but forested and riparian habitats (which are lacking in the siting corridors) are present in and adjacent to Horse Butte Wind and Meadow Creek Wind. The Ririe Reservoir is immediately east of these facilities, and some turbines at Meadow Creek Wind are less than 2 miles from the reservoir, which is bordered by steep mountains and cliffs that likely provide substantial roosting habitat for bats (SWCA 2015; Tetra Tech 2014).

Bat fatalities at Meadow Creek Wind were highest at turbines closest to the reservoir and associated cliff habitat, but formal conclusions as to the importance of this habitat cannot be made due to the non-random nature of the turbines sampled. These results, however, and the much lower fatality rates reported from Horse Butte Wind immediately to the west 1) highlight the high degree of spatial variability in bat fatalities from individual turbines and 2) support the conclusion that turbine micro-siting can be an effective means of reducing bat fatalities at wind energy facilities but introduces uncertainty when attempting to quantitatively assess the project's potential bat fatality rate. Data are also lacking on how fatality rates at existing wind facilities change over time, and it is unknown whether initially high fatality rates may decline over time as bats adjust their behavior in response to the presence of the wind energy facility, as habitat is degraded or lost, or as the size of bat populations decline.

For comparing the potential effects of the alternatives on bat populations, the estimated bat fatality rate for each action alternative was calculated by applying the mean bat fatality for the EPA North American Deserts Level I Ecoregion of 1.5 bat fatalities per MW per year (WEST 2021c) to the estimated range of generation capacity under each alternative (Table 3.3-4). An estimated maximum bat fatality rate is also presented for each action alternative based on the highest mean bat fatality rate reported for the regions (7.40 bat fatalities per MW per year). This is consistent with data from 2020 indicating that 75% of U.S. wind energy facilities reported fewer than 7.7 bat fatalities per MW per year (Allison and Butryn 2020) and is also consistent with the fatality rates that have been observed at existing wind energy facilities in Idaho (see Table 3.3-3). Although this may be an oversimplification, and there are inherent uncertainties in estimating bat fatality rates, especially over the long term, these estimates allow for a reasonable comparison of the magnitude of effects that could be expected for each action alternative. Although it is unclear whether curtailment was being employed at any of the facilities included in WEST (2021c), Allison and Butryn (2020) specifically excluded facilities where curtailment was employed and reported fatality rates similar to those from the bat mortality analysis. Therefore, Table 3.3-4 presents fatality estimates that would be expected before potential mitigation measures, such as curtailment or acoustic deterrents, are implemented.

The expected generation capacity of the project would be the greatest under Alternative B, though the range of expected capacity for the other action alternatives all overlap with the range of expected capacity for Alternative B to some degree (see Table 3.3-4). As a result, the bat fatality rate would likely be the highest under Alternative B. However, if the minimum generation scenario for Alternative B is constructed, it could result in lower bat fatality rates than if the maximum generation scenario under one of the other action alternatives is constructed. Based on mean bat fatality rates observed at existing wind facilities in the western United States, the bat fatality rate under Alternative B would be 1,800 to 3,141 bat fatalities per year (1.5 bat fatalities per MW per year × 1,200–2,094 MW) without the use of acoustic deterrents or curtailment, depending on the final generation capacity. However, the bat fatality rates observed at other wind energy facilities in the analysis area suggests that Alternative B could result in as many 8,800 bat fatalities per year at the minimum generation scenario (7.4 bat fatalities per MW per year × 1,200 MW) and as many as 15,496 bat fatalities per year at the maximum generation scenario (7.4 bat fatalities per MW per year × 2,094 MW). Alternative B would also include more siting corridors near the existing irrigation canals and the lava crater roost site (i.e., areas of concentrated bat activity) than the other action alternatives. Acoustic monitoring indicates bat activity in the analysis area is concentrated near these canals and the lava crater, and bats roosting at the lava crater could forage along the irrigation canals. Alternative B would include more siting corridors between these two features than the other action alternatives and would expose bats on foraging flights to more risk of collision. Given this, without the implementation of appropriate mitigation measures, the fatality rate under Alternative B could be closer to the maximum fatality rate than the mean (see Table 3.3-4).

Table 3.3-4. Summary of Estimated Bat Fatalities by Action Alternative

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated generation capacity in MW	1,200–2,094	1,134–1,554	840–1,074	807–1,164	723–1,205
Estimated bat fatalities per year from turbine collisions	1,800–3,141 (mean) 8,880–15,496 (maximum)	1,733–2,331 (mean) 8,547–11,500 (maximum)	1,256–1,611 (mean) 6,194–7,948 (maximum)	1,210–1,746 (mean) 5,972–8,614 (maximum)	1,085–1,808 (mean) 5,350–8,917 (maximum)
Estimated bat fatalities for project life from turbine collisions	54,000–94,230 (mean) 266,400–464,880 (maximum)	51,990–69,930 (mean) 256,410–345,000 (maximum)	37,680–48,330 (mean) 185,820–238,440 (maximum)	36,300–52,380 (mean) 179,160–258,420 (maximum)	32,550–54,240 (mean) 160,500–267,510 (maximum)
Estimated bat fatality rate from turbine collisions	1.5 bats per MW per year (mean) 7.4 bats per MW per year (maximum)	Same across action alternatives	Same across action alternatives	Same across action alternatives	Same across action alternatives

Note: For Alternatives B–E, the minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 6-MW turbines. For the Preferred Alternative, the minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 5-MW turbines. Fatality estimates are based on data from WEST (2021c) and are not intended to be precise estimates but are presented to allow for a meaningful comparison between alternatives. Estimated fatality rates do not account for the implementation of mitigation measures.

Bat Populations

The potential effect to individual bat species and their populations is expected to vary based on how frequently they occur in the analysis area, their risk of colliding with operational turbines (based on their flight characteristics and the frequency of fatalities observed at other wind energy facilities in the United States), and the current status of their populations (i.e., whether or not the species is vulnerable or declining). Although the acoustic monitoring surveys (WEST 2021a, 2022a) are useful for establishing which species occur in the analysis area and periods of peak activity, preconstruction acoustic activity does not appear to be correlated with observed bat fatality rates following construction (Arnett et al. 2015; Solick et al. 2020). Therefore, patterns of bat fatalities observed at existing wind energy facilities were used as the basis for determining the likelihood for collision. Since wind energy facilities in the far western and southwestern United States, which constitute much of the analysis area, are underrepresented in the Allison and Butryn (2020) and WEST (2021c) databases, there is uncertainty in the predicted fatality estimates and the consequences to bat populations.

Per the BLM's special-status species management manual (BLM 2008), it is the BLM's policy to "initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA." Guidance for identifying potential impacts to special-status bat species and the appropriate measures to mitigate those impacts are provided in the USFWS's land-based wind energy guidelines (USFWS 2012). These guidelines recommend a tiered study approach, beginning with preliminary site evaluation (Tier 1) and site characterization (Tier 2), followed by preconstruction wildlife baseline studies (Tier 3), and where appropriate, postconstruction monitoring (Tiers 4 and 5). Additional direction on avoiding, minimizing, and mitigating for adverse impacts is provided in BLM (2021).

To minimize impacts to bat species and to reduce the potential for significant adverse effects, MVE has developed a Bird and Bat Conservation Strategy (BBCS) (Appendix M of MVE [2023]), as described in applicant-committed measure 137. As part of the BBCS, MVE has completed Tier 1, 2, and 3 studies to characterize bat use in the siting corridors, to assess the potential for the project to effect bat species of concern, and to identify methods for measuring actual impacts following construction (applicant-committed measure 137). The results of the Tier 1 and 2 studies were used to site turbines to minimize development in areas where important resources for bats may be present. MVE would avoid riparian areas, wetlands, and other waterbodies to the greatest extent practical and would site turbines at least 1,000 feet from the irrigation canals (applicant-committed measures 136 and 138), which would reduce the potential for bats to be exposed to turbines while foraging. Turbine lighting was designed considering USFWS (2012) to avoid attracting birds or bats (applicant-committed measures 20 through 24).

Since bats are more active at lower wind speeds, turbine fatality rates tend to be highest when speeds are low (Allison 2018). Throughout operation turbine blades would be feathered when wind speeds are below the cut-in speed for the turbine (i.e., the speed at which wind turbines begin generating electricity) (applicant-committed measure 160) which would proactively reduce the risk of bats colliding with turbines. Feathering turbine blades prevents them from rotating (or greatly reduces their rotational speed). If blades are not feathered, turbines may continue to rotate at wind speeds that are too low for the turbine to generate power. Although there has been no formal evaluation of the effectiveness of feathering below turbine cut-in speeds to date, initial studies have shown a statistically significant reduction in bat fatalities of 36% to 58% (though in one study fatalities were only reduced by 9%) (Allison 2018). Feathering turbines when speeds are below the cut-in speed does not reduce the power generated by a wind energy facility, but it can increase maintenance costs due to the increased wear and tear on the mechanisms that rotate the blades. When turbine blades are feathered at wind speeds above the cut-in speed for the turbine, it is referred to as curtailment because it reduces (or curtails) the amount of power generated by the facility by reducing the rotational speed of the turbine when it would normally be generating electricity.

Curtailment would be considered as an adaptive management measure and is discussed in more detail below.

Following the procedures described for Tier 4 studies in USFWS (2012), MVE would conduct a minimum of 2 years of postconstruction bat fatality monitoring to keep informing adaptive management, as outlined in the BBCS (applicant-committed measure 150). Tier 4 studies are necessary to estimate the actual bat fatality rate at the facility following construction and to evaluate the effectiveness of both the preconstruction and postconstruction avoidance and minimization measures described above. In cooperation with the IDFG and USFWS, the BLM would evaluate the fatality rates produced from postconstruction monitoring and incidental reporting during operations to determine adaptive management measures (as described in the BBCS and in EIS Appendix 4) to reduce bat fatalities (applicant-committed measure 157). MVE would rely on additional specific, targeted monitoring studies to measure the effectiveness of adaptive management measures and modify or discontinue measures as appropriate based on monitoring results (applicant-committed measure 159). If this monitoring indicates that adaptive management measures have not been successful at reducing bat fatalities below acceptable thresholds, MVE would consider developing a strategic curtailment plan that target periods and locations of peak risk to bats (applicant-committed measures 158).

Curtailment strategies can be further refined by incorporating a number of variables (such as temperature and barometric pressure) into models that predict the specific conditions when curtailment is likely to result in the greatest benefit to bats, and to minimize the use of curtailment at times when there is a lower risk of bat fatalities. Sensor-based systems currently under development directly detect bat activity near turbines to allow for a highly targeted curtailment strategy that minimizes the reduction in power generation that results from curtailment. Curtailment typically reduces the bat fatality rate by more than 50%, and by as much as 93% in one instance, while reducing the annual output of the facility by 1% or less (Adams et al. 2021; Arnett et al. 2010, 2015). Curtailment strategies that target the fall migratory period for bats would be more effective at reducing fatalities of migratory tree bats (i.e., hoary bat and silver-haired bat) than resident cave-hibernating species (i.e., big brown bat, little brown bat, western small-footed bat). Curtailment is far more effective at reducing bat fatalities than avian fatalities, in part because bats do not collide with stationary structures as often as birds (Cryan and Barclay 2009), but also because bats (and migratory tree bats in particular) appear to be attracted to turbines when they are rotating slowly (Cryan et al. 2014).

Using data collected during postconstruction monitoring, MVE would develop curtailment strategies in coordination with the BLM, USFWS, IDFG, and Idaho Governor’s Office of Species Conservation (OSC) (applicant-committed measure 158). The curtailment strategies would define standard operating procedures for operation during different seasons (i.e., migratory periods) and different times of the day. The standard operating procedures would describe how operations staff would monitor for the presence of bats (and raptors) around turbines, how the decision to curtail specific turbines would be made, and how the curtailment would be implemented. This would allow individual or small sets of turbines to be curtailed without significantly changing the operation of the remaining turbines. The curtailment strategy would describe the type and number of detection devices required for successful implementation and would include an adaptive management framework that identifies how fatalities would be monitored and when adjustments would be necessary to further reduce fatalities.

Adaptive management measures also include the use of acoustic deterrents to reduce bat fatalities at operational turbines (applicant-committed measure 157). Several systems are currently under development, but all entail speakers that emit ultrasonic sound at the same frequency many bats use for echolocation (20–50 kilohertz).

Although there are only two commercially available acoustic deterrent systems available at this time, the science and technology behind these devices are rapidly advancing, and more sophisticated and effective systems are likely to become available in the near future (Sievert et al. 2021). Initial results are promising, with an 18% to 78% reduction in the fatality rate for some species observed at turbines equipped with NRG Systems deterrents (Weaver et al. 2020). However, in most other studies, fatalities are reduced by 50% or less (Arnett et al. 2013; Kinzie et al. 2018; Romano et al. 2019; Ugland 2020). Acoustic deterrents are only effective for a limited number of species, including hoary bat, silver-haired bat, and Mexican free-tailed bat (*Tadarida brasiliensis*), whereas other species, especially those with high-frequency calls (i.e., most *Myotis* species), showed no response to the ultrasonic deterrents (Arnett et al. 2013; Romano et al. 2019; Weaver et al. 2020). Although some of the variation in effectiveness among species is likely attributable to differences in foraging strategies and flight patterns, higher frequency sound attenuates more rapidly than lower frequency sound, reducing the distance at which deterrents are effective for bats with higher-frequency calls (Weaver et al. 2020).

Even with these measures, a large number of bat collisions with turbines could still occur under Alternative B, and additional measures would be needed to minimize effects or assess the effectiveness of adaptive management measures. Compensatory mitigation (see Section 3.3.1.4) may need to be implemented if curtailment, acoustic deterrents, and other adaptive management measures are not effective at lowering bat fatality rates (as described in the BBCS).

CAVE-HIBERNATING BATS

The big brown bat accounts for more fatalities at existing U.S. wind energy facilities than any other cave-hibernating bat species, followed closely by the little brown bat (Allison and Butryn 2020; WEST 2021c). Similar fatality rates were reported for both species in the USFWS Pacific Region in 2018 (Allison and Butryn 2020), but the little brown bat fatality rate was nearly twice the big brown bat fatality rate for the Pacific Region in 2020 (Allison and Butryn 2020). The western small-footed bat has been recorded as a fatality at existing wind energy facilities (WEST 2021c), but there have been too few fatalities to determine regional fatality rates. Big brown bat fatalities were only recorded at two of the four existing wind energy facilities in Idaho for which data are available (Horse Butte Wind and Rockland Wind). Only 1 big brown bat fatality was recorded at Horse Butte Wind over 3 years of study, as compared to 27 hoary bat fatalities and 23 silver-haired bat fatalities recorded over the same time period. At Rockland Wind, 25 big brown fatalities were recorded across all three study periods, as compared to 44 hoary bat fatalities and 52 silver-haired bat fatalities recorded over the same time period (SWCA 2015; Tetra Tech 2015). Little brown bat fatalities were only recorded at Power County Wind, where they accounted for less than 10% of all bat fatalities (Hallingstad et al. 2013). A single western small-footed bat fatality was recorded at Horse Butte Wind (SWCA 2015). Although the fatality rate observed at existing wind energy facilities for these three species is an order of magnitude lower than that for hoary bat and silver-haired bat, the big brown bat, little brown bat, and western small-footed bat have been impacted by the spread of WNS to differing degrees and are discussed in further detail below.

Big Brown Bat

As described in the affected environment, reliable estimates of the big brown bat population size are not available, but the species appears to be common across most of its range and did not experience extreme population declines from WNS, and in some areas, may even be increasing. Given the large range for the species, the apparently stable population, and the low risk of collision with turbines, there is a much lower risk of population-level effects to big brown bats from turbine collisions than for other bat species that are commonly recorded as fatalities at wind energy facilities. However, because big brown bats typically do not migrate long distances and their populations are less well-mixed (Hayes and Wiles 2013), the potential remains for collisions with turbines to cause declines in big brown bat populations within the analysis area. The big brown bat is also listed as a BLM special-status species for the SFO, indicating special management considerations may be warranted to prevent a trend toward federal listing.

Since Alternative B has the highest range of generation capacities, it would result in the greatest number of big brown bat fatalities, and thus would have the largest effect on the big brown bat population in the analysis area. The magnitude of this effect is difficult to determine given the lack of site-specific information on big brown bat populations. Feathering turbine blades (applicant-committed measure 160) may reduce big brown bat fatalities. Postconstruction monitoring (applicant-committed measure 150) would assess the project's big brown bat fatality rate and determine adaptive management measures (applicant-committed measure 157), including curtailment, needed to reduce fatalities. Additional specific, targeted monitoring (applicant-committed measure 159) would determine if adaptive management measures have been effective at reducing big brown bat fatalities and if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts (as described in the BBCS).

Little Brown Bat

Reliable estimates of the little brown bat population size are not available, but the extreme decline in northeastern United States and southeastern Canada populations of the species is well documented, and the species is at a high risk of being extirpated from that region. WNS has continued to spread westward and may have negative effects on the regional population in the near future, though the magnitude of this effect is uncertain. Although little brown bats forage close to the ground and represent a small fraction of the bat fatalities observed at existing U.S. wind energy facilities, their population may be sensitive to even a small increase in fatalities from turbine collisions. The little brown bat is a BLM special-status species for the SFO, an Idaho SGCN, and is under review for listing under the ESA by the USFWS, indicating special management considerations may be warranted to prevent further declines.

Since Alternative B has the highest range of generation capacities, it would result in the greatest number of little brown bat fatalities, and thus would have the largest effect on the little brown bat population in the analysis area. The magnitude of this effect is difficult to determine given the lack of site-specific information on little brown bat populations and the uncertainty surrounding the impact that WNS will have on the little brown bat population in the analysis area over the 30-year operation phase (Section 3.3.1.2.7 [Cumulative Impacts]). Based on the overall estimated bat fatality rate (see Table 3.3-4) for Alternative B and the pattern of bat fatalities observed at existing U.S. wind facilities, it is likely that dozens to hundreds of little brown bats would be killed as result of collisions with turbines each year. Over the life of the facility, this could add up to several thousand little brown bat fatalities. Feathering turbine blades (applicant-committed measure 160) may reduce little brown bat fatalities. Postconstruction monitoring (applicant-committed measure 150) would assess the project's little brown bat fatality rate and determine if adaptive management measures (applicant-committed measure 157), including curtailment, are needed to reduce fatalities. Additional specific, targeted monitoring (applicant-committed measure 159) would determine if adaptive management measures have been effective at reducing little brown bat fatalities and if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts (as described in the BBCS).

Western Small-Footed Bat

Only two western small-footed bat fatalities have been documented at existing U.S. wind energy facilities, both in Idaho (WEST 2021c, 2022b). Collision with turbines is not a major threat to the species (Hammerson 2015). Although western small-footed bats occur frequently in the siting corridors, they have a low likelihood of colliding with turbines and have a large, relatively stable population. Therefore, relatively few fatalities would be expected, and population-level effects to the western small-footed bat are unlikely, though the risk of population-level effects would increase if WNS causes future declines in the population (Section 3.3.1.2.7 [Cumulative Impacts]).

Based on the overall estimated bat fatality rates (see Table 3.3-4), Alternative B would result in the greatest number of western small-footed bat fatalities. Feathering turbine blades (applicant-committed measure 160) may reduce western small-footed bat fatalities. Postconstruction monitoring (applicant-committed measure 150) would assess the project's western small-footed bat fatality rate and determine if adaptive management measures (applicant-committed measure 157) are needed to reduce fatalities. Additional specific, targeted monitoring (applicant-committed measure 159) would determine if adaptive management measures have been effective at reducing western small-footed bat fatalities and if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts.

MIGRATORY TREE BATS

Hoary bat and silver-haired bats were two of the most frequently recorded species during project bat acoustic monitoring surveys and are among the most common bat fatalities at many wind energy facilities (Allison and Butryn 2020; WEST 2021c). These two species accounted for most of the bat fatalities recorded at existing wind energy facilities in Idaho (Hallingstad et al. 2013; SWCA 2015; Tetra Tech 2014, 2015). Therefore, it is expected that these two species would account for most of the bat fatalities that would occur from collisions with turbines, and they are discussed in further detail below.

Hoary Bat

Although the hoary bat is one of the most widespread and numerous bat species in the United States, evidence shows that the population is beginning to decline rapidly and that the growth of wind farms is driving this decline (Allison 2018; Electric Power Research Institute 2020b; Frick et al. 2017; Rodhouse et al. 2019). Although some experts believe the population growth rate for the species is high enough to offset the losses from wind turbine fatalities (Frick et al. 2017), as the number of turbines increases and, consequently, the number of bat fatalities increases, it will be increasingly difficult for the hoary bat to offset those fatalities through increased population growth rates. Further, the limited empirical data available on the population growth rate of other bat species indicate that most have a relatively low population growth rate and, therefore, are susceptible to relatively small increases in fatalities when sustained over many years (Frick et al. 2017).

Since Alternative B would have the highest range of generation capacities, it would result in more bat fatalities than any other action alternative, most of which are likely to be hoary bats. Thus, based on the fatality estimates in Table 3.3-4, it would be conservative to estimate that hundreds if not thousands of hoary bats would be killed each year because of collisions with turbines under Alternative B. Over the 30-year life of the facility, this could equate to tens of thousands of hoary bat fatalities. The effects of such a large number of fatalities on a species with a low population growth rate are expected to be substantial. Feathering turbine blades (applicant-committed measure 160) may reduce hoary bat fatalities, but Alternative B still may not meet the BLM's objectives for managing special-status species as described in BLM (2008). Postconstruction monitoring (applicant-committed measure 150) would assess the project's hoary bat fatality rate and determine if adaptive management measures (applicant-committed measure 157), including curtailment, are needed to reduce fatalities. Additional specific, targeted monitoring (applicant-committed measure 159) would determine if adaptive management measures have been effective at reducing hoary bat fatalities and if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts.

Silver-Haired Bat

Accurate estimates of silver-haired bat population size and trend are unavailable, and studies on the species' response to wind energy development have produced inconsistent results (Davy et al. 2020; Green et al. 2021). Although silver-haired bats were recorded far less frequently than hoary bats during the 2020 bat acoustic monitoring surveys (WEST 2021a), postconstruction monitoring data from other wind energy facilities in Idaho and the USFWS Pacific Region (Allison and Butryn 2020; WEST 2021c) suggest that the silver-haired bat fatality rate would be higher than predicted based solely on the results of project acoustic monitoring surveys. Most studies on population-level effects to migratory tree bats from wind energy have focused on hoary bat, but the impacts to silver-haired bat populations are expected to be similar based on the shared life history traits of these species (Frick et al. 2017; Peters et al. 2020).

Thus, the impact of Alternative B on the silver-haired bat population would be similar to that described for hoary bats above. Namely, Alternative B would result in more silver-haired bat fatalities than any other action alternative and would have the greatest contribution to declines in the silver-haired bat population. Feathering turbine blades (applicant-committed measure 160) may reduce silver-haired bat fatalities, but Alternative B still may not meet the BLM's objectives for managing special-status species as described in BLM (2008). Postconstruction monitoring (applicant-committed measure 150) would assess the project's silver-haired bat fatality rate and determine if adaptive management measures (applicant-committed measure 157) are needed to reduce fatalities. Additional specific, targeted monitoring (applicant-committed measure 159) would determine if adaptive management measures have been effective at reducing silver-haired bat fatalities and if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts.

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (Table 3.3-5; also see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to bats under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for bat populations and roosting habitat are summarized in Table 3.3-5 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.3-5. Mitigation for Bat Populations and Roosting Habitat

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
136	–	j
137	–	n
138	–	u
20	–	v
21	–	w
22	–	y
23	–	aa
24	–	mm
160	–	oo
150	–	pp
157	–	–
158	–	–
159	–	–

Note: All measures are detailed in EIS Appendix 4.

Avoiding turbine placement and minimizing other infrastructure within 0.25 mile of known bat roosts (measure j) (i.e., the lava crater roost site) could help reduce bat fatalities but would not eliminate impacts to bats roosting at this feature because bats could still collide with turbines during foraging and migratory flights beyond the 0.25-mile buffer. The refinements to the postconstruction fatality monitoring requirements (measure n) and continued bat acoustic monitoring (measure aa) would allow more precise quantification of impacts to bats than under Alternative B alone, and would lead to a more informed and targeted curtailment strategy (if necessary), which would have less impact on the power output of the facility. Measures u, v, and mm would also lead to a more informed curtailment strategy, measure y would allow the curtailment strategy to be implemented sooner than under Alternative B alone, and measure w would clarify and expand the thresholds that would trigger an adaptive management response (such as curtailment). With the implementation of these additional minimization measures, the bat fatality rate under Alternative B would likely be further reduced. However, residual impacts would likely still occur, and compensatory mitigation (see Section 3.3.1.4) may be warranted.

The potential for significant impacts to bat roosting habitat under Alternative B is low, but these impacts would be further reduced by measures oo and pp, which would help ensure that mitigation measures implemented during construction are effective at minimizing or avoiding impacts to bat roosting habitat.

Summary of Alternative B and Alternative B with Additional Measures

In summary, Alternative B is likely to result in the most bat fatalities of the action alternatives (see Table 3.3-4) because it has the highest range of generation capacities and because it includes the most siting corridors in potential foraging routes (i.e., between the two existing irrigation canals and the lava crater roost site; see Figure 3.3-2). Should the observed fatality rate for the project be near the upper end of fatality rates observed at other wind energy facilities in the western United States, Alternative B could result in more than 15,000 bat fatalities per year, most of which would likely be hoary bats and silver-haired bats. With the implementation of additional project-specific measures, the bat fatality rate under Alternative B with Additional Measures is more likely to be near the mean (3,141 bat fatalities per year).

To the greatest extent practical, the project was sited to avoid turbine placement near wetlands and other waterbodies that may concentrate bat activity. Alternative B also includes turbine feathering to proactively reduce potential bat fatalities. However, a large number of bat fatalities could still occur. Additional BLM project-specific measures would prohibit turbine placement within 0.25 mile of known roost sites and would require additional surveys and enhanced fatality monitoring, which could further reduce bat fatality rates and allow for impacts to be more precisely quantified. This monitoring would be used to provide better estimates of the project’s actual bat fatality rate and help identify which adaptive management measures (including curtailment) need to be implemented, if any. These measures may substantially reduce fatalities, but hundreds to thousands of bat fatalities could still occur each year. As the understanding of bat interactions with wind turbines continues to grow and technology advances, there may be additional options available for reducing bat fatalities in the future. However, both hoary and silver-haired bats are special-status species whose populations are declining and are vulnerable to further disturbance, and significant effects to their populations in the analysis area cannot be ruled out. As a result, compensatory mitigation (see Section 3.3.1.4) may be warranted if Alternative B does not meet the BLM’s objectives for special-status species management, as described in BLM (2008).

Although the number of expected big brown bat, little brown bat, and western small-footed bat fatalities would be an order of magnitude lower than those for hoary bat or silver-haired bat, both big brown bat and little brown bat may be susceptible to small increases in mortality because of the impacts of WNS on their populations. These effects have been less severe for big brown bat, and impacts from turbine collisions are less likely to affect populations of this species. Little brown bat populations have experienced much steeper declines, and western populations may experience future declines if WNS continues to spread; considering these factors, even the relatively small number of fatalities that would occur under Alternative B with Additional Measures could exacerbate the decline in their populations. Western small-footed bats have not yet experienced declines from WNS, and fatalities at wind energy facilities are not common; however, this species' population could be threatened as both WNS and wind energy development expand further into its range. Other bat species that may experience fatalities from turbine collisions include California bat, canyon bat, fringed bat, long-legged bat, pallid bat, Townsend's big-eared bat, western long-eared bat, and Yuma bat. These species have not been recorded as fatalities at wind energy facilities in large numbers (or at all), and turbine collisions are not currently considered a major threat to their populations. Given this, the small number of fatalities that would be expected under Alternative B is unlikely to impact populations of these species (see Table App3-2 in EIS Appendix 3). Since postconstruction monitoring would be implemented, there would be an opportunity to assess the fatality rate for each of these species, and the adaptive management measures described above could be implemented to reduce fatalities of these species, if necessary.

Although the bat fatality rate is likely to change over time, effects to bats from collisions with turbines would persist over the 30-year operation phase, ceasing after the turbines are removed during decommissioning. Alternative B with Additional Measures would also have the greatest impact on bat roosting features in the analysis area, though the potential for significant impacts is low.

3.3.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects under Alternative C would be similar to Alternative B, but the magnitude of effects may be reduced. Although the range of generation capacity from Alternative C overlaps with that of Alternative B, the maximum generation capacity of Alternative C would be approximately 26% lower (see Table 3.3-4), which would lead to a corresponding decrease in estimated bat fatalities. However, because of the overlap in the range of generation capacities, whether Alternative C would reduce impacts compared to Alternative B would depend on the final design of the facility and its generation capacity. This alternative would also eliminate several of the westernmost siting corridors, which are near the two existing irrigation canals in the analysis area that may concentrate bat activity. This elimination would also reduce the number of siting corridors separating the irrigation canals from the lava crater roost site, but most would remain, and the risk to bats using this potential foraging route would still be high. The elimination of siting corridors near the irrigation canals may reduce bat fatalities to some degree but would do little to benefit the migratory tree bat species that are at greatest risk of collisions with turbines.

Alternative C would implement the same avoidance and minimization measures as Alternative B with Additional Measures, which includes a minimum of 2 years of postconstruction monitoring to measure the project's actual bat fatality rate to determine which adaptive management measures (including curtailment) need to be implemented to reduce fatalities, if any. Additional specific, targeted monitoring would assess the effectiveness of adaptive management measures and determine if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts.

Alternative C would eliminate the siting corridors nearest Wilson Butte Cave, but the impacts to other potential bat roosting features identified in the analysis area (including the lava crater roost site) would be similar to Alternative B. The total ground disturbance footprint would be slightly reduced under Alternative C, which may reduce impacts to other potential bat roosting features (such as rock piles and trees). Although fewer impacts to bat roosting features would occur under Alternative C, the potential for impacts under any action alternative is low due to the relative lack of suitable roosting habitat in the analysis area.

3.3.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects under Alternative D would be similar to Alternative B, but the magnitude of effects would be reduced. The maximum generation capacity under Alternative D would be less than Alternatives B and C but greater than Alternative E and the Preferred Alternative (see Table 3.3-4). The maximum generation capacity under Alternative D is lower than the minimum generation capacity of both Alternatives B and C. Similar to Alternative C, Alternative D would remove siting corridors west of Crestview Road and would reduce development near the irrigation canals. Alternative D would remove additional siting corridors east of Crestview Road, including the siting corridor in which the lava crater roost site is located, which would further reduce the potential impacts to this roost site and the potential foraging route between the roost site and canals.

Although Alternative D could reduce the estimated bat fatality rate by more than 50% when compared to Alternative B, this alternative could still result in nearly 8,000 bat fatalities per year, though with the implementation of avoidance and minimization measures (as described for Alternative B with Additional Measures), the fatality rate would likely be closer to the mean (1,746 bat fatalities per year). As with the other action alternatives, MVE would complete a minimum of 2 years of postconstruction carcass monitoring to measure the project's actual bat fatality rate to determine which adaptive management measures (including curtailment) need to be implemented to reduce fatalities, if any. Additional specific, targeted monitoring would assess the effectiveness of adaptive management measures and determine if compensatory mitigation (see Section 3.3.1.4) is warranted to address residual impacts.

Similar to Alternative C, Alternative D would eliminate the siting corridors nearest Wilson Butte Cave. The elimination or reduction of most siting corridors east of Crestview Road would reduce development near Kimama Cave and the unnamed cave in the sage-grouse lek avoidance area. Alternative D is the only action alternative that would eliminate the siting corridor containing the lava crater roost site, which would avoid potential impacts to this roosting feature from increased human presence and noise at work sites immediately outside the avoidance buffer. Alternative D would also have the second-smallest overall disturbance footprint; therefore, the only alternative that would further reduce impacts on bat roosting features in the analysis area is the Preferred Alternative (which would have fewer impacts), though the potential for impacts under any action alternative is low.

3.3.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects under Alternative E would be similar to Alternative B, but the magnitude of effects would likely be reduced. The range of generation capacities under Alternative E is similar to the ranges for Alternative D and the Preferred Alternative. Only Alternative D has a lower maximum generation capacity, and only the Preferred Alternative has a lower minimum generation capacity. Therefore, the bat fatality rate under Alternative E would be similar to the bat fatality rate under Alternative D and the Preferred Alternative. Alternative E would also eliminate siting corridors near the irrigation canals and would include the fewest siting corridors in potential bat foraging routes (i.e., between the lava crater roost site and irrigation canals).

Although the maximum generation capacity under Alternative E would be slightly higher than Alternative D, Alternative E would be unlikely to result in a higher bat fatality rate because of the reduced development in areas that pose a high risk to bats. However, because there is no guarantee that preconstruction acoustic activity would accurately predict postconstruction fatalities, thousands of bat fatalities per year could still occur under this alternative. Alternative E would implement the same avoidance and minimization measures as Alternative B with Additional Measures, including 2 years of postconstruction monitoring to assess bat fatality rates and to determine which adaptive management measures (including curtailment) need to be implemented to reduce fatalities, if any. Additional specific, targeted monitoring would assess the effectiveness of adaptive management measures and determine if compensatory mitigation (see Section 3.3.1.4) is warranted to address any residual impacts.

Alternative E would also reduce development near Wilson Butte Cave, but it would not eliminate or reduce the siting corridors east of Crestview Road, and therefore would not have the same benefit to known bat roosting features (including the lava crater roost site) as Alternative D. However, the overall ground disturbance footprint for Alternative E would be similar to Alternative D, and the impact on other potential bat roosting features (such as rock piles and trees) would be similarly reduced. Only the Preferred Alternative would have a smaller ground disturbance footprint. Therefore, in comparison to Alternative E, only Alternative D and the Preferred Alternative would further reduce impacts on bat roosting features in the analysis area, though the potential for significant effects under any action alternative is low.

3.3.1.2.6 PREFERRED ALTERNATIVE

The types and duration of effects under the Preferred Alternative would be similar to Alternative B, but the magnitude of effects would likely be reduced. The Preferred Alternative has the lowest minimum generation capacity and therefore could have the lowest bat fatality rate and the fewest impacts on bat populations. The maximum generation capacity of the Preferred Alternative is slightly higher than Alternatives D and E; therefore, the Preferred Alternative could result in more bat fatalities than Alternatives D and E depending on the final design of the facility and its generation capacity. The Preferred Alternative would also eliminate siting corridors near the irrigation canals but would include slightly more siting corridors in potential bat foraging routes (i.e., between the lava crater roost site and irrigation canals) than Alternative E.

The siting corridors eliminated under the Preferred Alternative would be similar to those eliminated under Alternative E, which would reduce development near Wilson Butte Cave but would not eliminate the siting corridors nearest the lava crater roost site. However, the overall ground disturbance footprint for the Preferred Alternative would be the least of the action alternatives, and the impact on other potential bat roosting features (such as rock piles and trees) would be the least of the action alternatives. Therefore, of the action alternatives, only Alternative D would have fewer impacts on bat roosting features in the analysis area than the Preferred Alternative, though the potential for significant effects under any action alternative is low.

3.3.1.2.7 CUMULATIVE IMPACTS

The rapid expansion of wind energy facilities across the United States is one of the greatest threats to the viability of many migratory bat species (BCI 2021; BLM 2005). Even with the implementation of additional project-specific measures, Alternative B would result in more bat fatalities than the other alternatives and could alone impact some bat populations (including special-status species such as hoary bat and silver-haired bat). When effects of the project are considered in combination with the effects of existing and future trends and actions (i.e., numerous wind energy facilities with high fatality rates across the landscape), the cumulative impacts could be significant for some bat populations and contribute to the decline of migratory tree bat populations.

Although cave-hibernating bats are at lower risk of turbine collisions, their populations have been (or could be) decreased by WNS and are vulnerable to small increases in mortality. Since WNS is not yet widespread in the western United States and it is unknown how rapidly the fungus that causes the disease will spread or how differences in hibernacula between the eastern and western United States will affect disease transmission, it is difficult to assess the magnitude of WNS on bat populations over the 30-year operation phase. However, if WNS has a similar impact on bats in the western United States, some species could experience significant declines from the cumulative impacts of the expansion of both WNS and wind energy development (including the project). Since Alternative B would have the highest bat fatality rate, it would have the greatest contribution to any future declines of cave-hibernating bat populations that may experience WNS (including special-status species such as big brown bat, little brown bat, and western small-footed bat).

As of March 2021, the total wind generation capacity in the United States was 118,000 MW (Bowers and Comstock 2021), and the total capacity in the analysis area (excluding Mexico, for which reliable data were not available) was 16,090 MW (Hoen et al. 2018 [version 6.1, released November 28, 2023]; Natural Resources Canada 2022). Though estimating cumulative fatalities is difficult, data indicate that 0.8 to 1.7 million bats were killed at U.S. wind energy facilities in the 12-year period from 2000 to 2011. It was estimated that 0.2 to 0.4 million bats would be killed in 2012, when installed wind capacity was approximately half of current capacity (Arnett and Baerwald 2013). Although relatively few of these fatalities have occurred in the analysis area where wind energy projects have only recently begun to expand, cumulative fatalities in the analysis area are likely to rapidly increase over the next 30 years with the rapid anticipated growth of wind energy. Lower bat fatality rates have been recorded at facilities in the Great Basin and Southwest Desert region, which suggests the impact of wind energy facilities on bat populations in this region could be less than expected based on fatality rates that have been observed in other regions. However, high fatality rates have been observed at some facilities in sparsely vegetated habitats that appear to lack suitable roosting habitat, and the lower fatality rates reported in the existing literature may be in part due to the relative lack of facilities that have been studied in this region (Arnett and Baerwald 2013). Even if fatality rates were relatively low, tens of thousands of bat fatalities could still occur in the analysis each year due to existing and future wind energy facilities. Thus, the project would contribute to additional turbine collisions that could lead to declines in bat populations in the analysis area over the next 30 years.

Alternative B would increase the total wind energy capacity in the United States by as much as 1.8% and the total capacity in the analysis area (excluding Mexico) by 7% to 13%. Although this may not lead to a directly proportional increase in bat fatalities, it illustrates the scale of the project and the number of other wind energy projects across the landscape, as well as the potential magnitude of the project’s contribution to bat population decline.

The other action alternatives would have a lower range of generation capacities; their proportional contribution to wind capacity in the analysis area (excluding Mexico) would be as follows:

- Alternative C: 7% to 10%
- Alternative D: 5% to 7%
- Alternative E: 5% to 7%
- Preferred Alternative: 4% to 7%

Although Alternatives C through E and the Preferred Alternative would have a lower range of generation capacities and therefore fewer bat fatalities than Alternative B, when any of these individual alternatives is considered in combination with existing and future trends and actions, there would likely still be population declines for some bat species, such as hoary bat, from the cumulative impacts of multiple facilities across the landscape.

3.3.1.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would irretrievably impact individual bats through fatalities caused by collision with turbines over the 30-year operation phase. The effects of the action alternatives would not be irreversible because, on their own, they would be unlikely to result in a trend toward listing under the ESA or a loss of population viability; however, when combined with reasonably foreseeable additional wind energy facilities in the analysis area, irreversible effects to bat populations could occur. Impacts to bats would be minimized through the implementation of mitigation measures. Loss or alteration of bat roosting habitat from ground disturbance during construction, operation, and decommissioning would irretrievably affect some individual bats for up to 84 to 86 years, i.e., the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 50 years for final reclamation). Caves, lava tubes, and known roost sites would be avoided, and the effects to other roosting features (such as shrubs and trees) would not be considered irreversible because most of the habitat would be reclaimed and restored in the long term and because large areas of similar habitat would remain available in the broader landscape.

3.3.1.4 Compensatory Mitigation

Even with the implementation of applicant-committed measures and other mitigation described above, including adaptive management measures (see EIS Appendix 4), there could be residual impacts to BLM special-status bat species. If adaptive management measures are implemented to reduce bat fatalities, additional bat fatality monitoring would be conducted to assess the effectiveness of these measures. If adaptive management does not reduce fatalities below the adaptive management threshold, compensatory mitigation would be required. The adaptive management threshold would be developed by the TAC and would be based on species' population trends and current meta-analysis of wind energy impact on birds and bats. Appropriate compensatory mitigation measures would be identified by the TAC and would be based on the best available science and technology at that time. Final decisions regarding compensatory mitigation would be the responsibility of the BLM Authorized Officer. Potential compensatory mitigation measures currently under consideration are listed under Compensatory Mitigation Actions in the Mitigation Framework for Birds and Bats in EIS Appendix 4.

3.3.2 Avian Populations[7]

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.3-6.

Table 3.3-6. Analysis Approach for Avian Populations

Issue Analyzed in Detail	How would turbine operation and met towers affect avian populations?
Associated Issues Analyzed in Brief	AIB-1: How would the project affect avian habitat? AIB-2: How would noise and human activity from project construction and operation affect nesting birds? AIB-3: How would the increase in project-related traffic affect the risk of direct avian mortality? AIB-4: What collision and electrocution risks do overhead powerlines pose to raptors? AIB-5: How would the project affect migration patterns of birds and bats?

[7] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

Analysis Area	Bird Conservation Region (BCR) 9 (Figure 3.3-3), which is an ecologically distinct region with similar bird communities, habitats, and resource management issues (North American Bird Conservation Initiative 2021). BCRs provide an ecological approach to capturing regional variation in bird occupancy and useful spatial units over which to examine changes in population. Data on avian fatality rates and installed wind capacity are also available at the BCR level, which allows for a more informed estimation of the avian fatality rates that could be expected under the action alternatives, and the relative contribution of those fatalities to the overall impact on regional avian populations.
Indicators	Fatality estimates based on generation capacity and avian mortality monitoring data from existing wind energy facilities in the analysis area. Number of met towers and estimates of associated fatalities.
Impacts Duration	The 30-year operation phase.
Data Sources	MVE's avian use (WEST 2021a, 2023) (Figure 3.3-4; Tables 3.3-7 and 3.3-8) and raptor nest surveys (WEST 2020, 2021b) to characterize avian use of the siting corridors. MVE's analysis of avian fatality rates and population effects from turbine operation (WEST 2021c). Publicly available data on avian species distribution, abundance, and population trends (numerous sources cited throughout this section, including Partners in Flight [2022], Sauer et al. [2019], and Timmer [2023]). Publicly available avian fatality monitoring data from existing wind energy facilities (sources cited throughout this section, including WEST [2011, 2019]).
Assumptions or Approach	Fatality estimates for the project are based on the fatality rates observed at other wind facilities in the western United States, and it is assumed that the fatality rate for the project would fall within the range observed at other wind facilities (on a per-MW basis). There are no previous studies of a wind energy facility of the size proposed, and it is unknown how this would affect avian fatalities during operation. Although the avian use surveys (WEST 2021a, 2023) were used to determine the species that may be present in the siting corridors and their seasons of use, the risk of fatalities from turbine collisions varies among species due to factors such as flight characteristics, type of prey, and habitat use. Thus, avian use observed before construction may not correlate directly to fatality rates after construction (WEST 2011). Given this, the species composition of fatalities observed at other western United States wind facilities was considered when determining collision likelihood and the magnitude of the effect on each species' population. Fatality rates are not intended to be precise predictions but are presented to allow for a meaningful comparison between the alternatives. The analysis of effects to avian populations also assumes avian fatalities from turbine collisions would have the same magnitude of impact on avian populations in BCR 9 regardless of where those fatalities occur in BCR 9. Therefore, the project's effects on avian populations at the BCR 9 scale would be directly proportional to the estimated fatality rate for each alternative. This is an oversimplification for some species that have variations among their smaller, local populations within BCR 9. Each of these smaller populations may not have the same relative contribution to the overall size and trend of their population in BCR 9. However, quantifying the relative importance of local populations to the overall population of a species in BCR 9 is beyond the scope of this analysis. Further, data on local avian populations are not available for many species and are of limited value for species for which data are available due to the much smaller sample sizes (e.g., Timmer [2023]). Where the data or literature indicates important differences between local populations of a species within BCR 9, additional qualitative discussion is provided in this EIS.

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Figure 3.3-3. Avian populations analysis area: Bird Conservation Region 9.

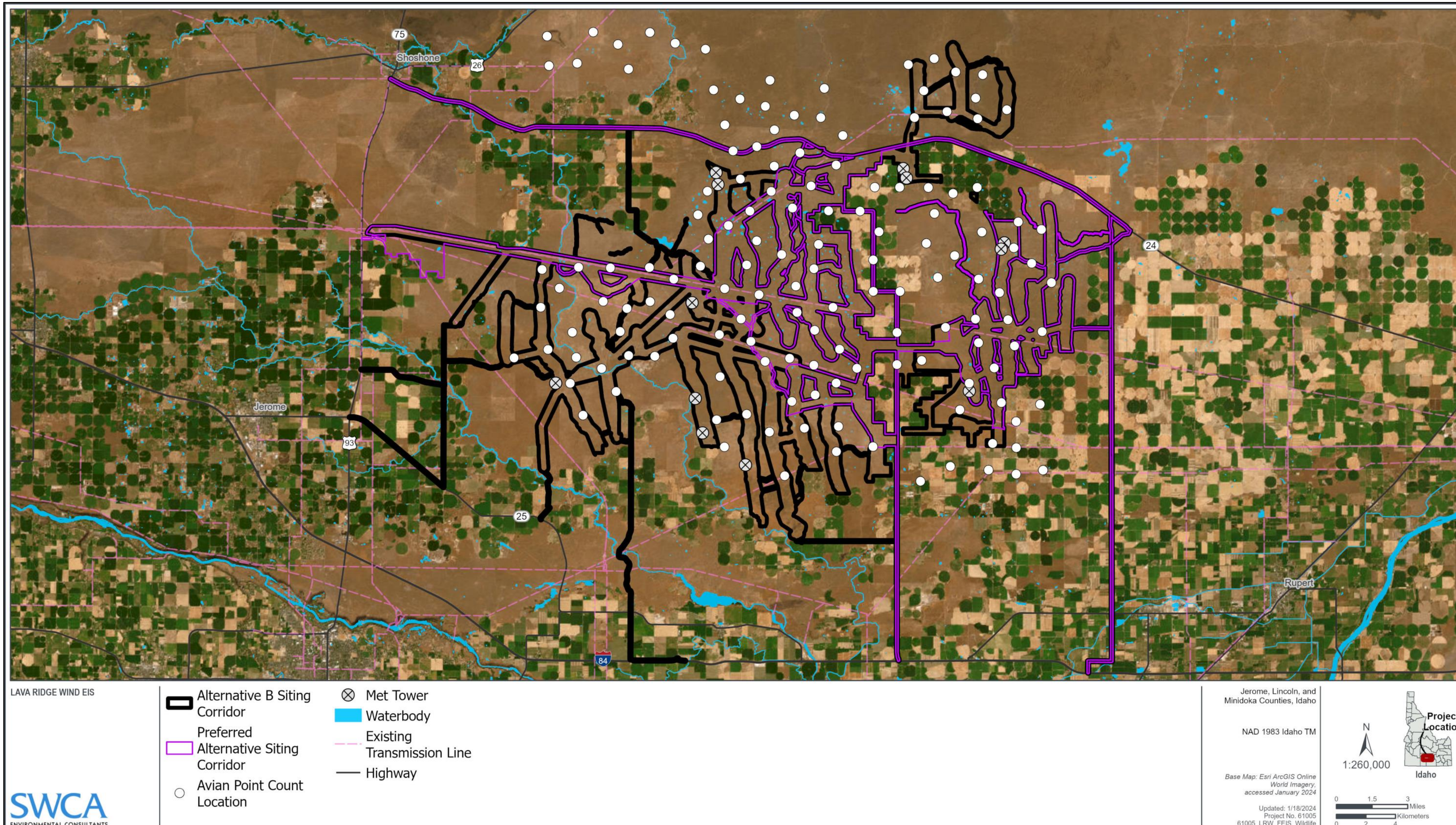

Figure 3.3-4. Avian use survey point count locations.

Table 3.3-7. Summary of the First Year of Avian Use Surveys

Common Name	Scientific Name	Spring Mean Use (% of use)	Summer Mean Use (% of use)	Fall Mean Use (% of use)	Winter Mean Use (% of use)
Small Birds					
Horned lark	*Eremophila alpestris*	2.19 (49.9%)	2.36 (62.6%)	4.12 (92.1%)	3.11 (85.7%)
Western meadowlark	*Sturnella neglecta*	1.46 (33.2%)	0.65 (17.3%)	0.20 (4.5%)	0.25 (7.0%)
Brewer's sparrow	*Spizella breweri*	0.22 (4.9%)	0.19 (5.0%)	0.03 (0.7%)	0 (0%)
21 other small bird species	N/A	0.53 (12.0%)	0.57 (15.1%)	0.12 (2.7%)	0.26 (7.3%)
Small birds total	*N/A*	*4.40 (100%)*	*3.76 (100%)*	*4.47 (100%)*	*3.62 (100%)*
Large Birds					
Common raven	*Corvus corax*	1.91 (53.7%)	0.66 (42.5%)	3.84 (84.0%)	3.07 (73.5%)
Diurnal raptors (9 species)	N/A	0.45 (12.7%)	0.61 (39.7%)	0.51 (11.3%)	0.37 (8.8%)
Waterfowl (5 species)	N/A	0.44 (12.4%)	< 0.01 (0.2%)	0.12 (2.7%)	0.69 (16.4%)
17 other large bird species	N/A	0.75 (21.2%)	0.27 (17.6%)	0.09 (2.0%)	0.05 (1.3%)
Large birds total	*N/A*	*3.55 (100%)*	*1.54 (100%)*	*4.57 (100%)*	*4.18 (100%)*

Note: Mean use is the number of individuals observed averaged across all point count plots and all visits. Small bird mean use is reported as the number of individuals observed per 100-m radius plot per 10-minute survey. Large bird mean use is reported as the number of individuals observed per 800-m radius plot per 60-minute survey.

Source: WEST (2021a).

Table 3.3-8. Summary of the Second Year of Avian Use Surveys

Species Groups	Spring Mean Use (% of use)	Summer Mean Use (% of use)	Fall Mean Use (% of use)	Winter Mean Use (% of use)
Large corvids (3 species)	2.91 (55.9%)	1.54 (41.4%)	2.11 (38.6%)	2.10 (49.0%)
Waterfowl (7 species)	0.08 (1.6%)	0.03 (0.9%)	2.89 (52.8%)	1.83 (42.7%)
Diurnal raptors (11 species)	0.94 (18.1%)	0.50 (13.5%)	0.33 (5.9%)	0.23 (5.4%)
Gulls (2 species)	0.52 (10.0%)	0.76 (20.4%)	0 (0%)	0.06 (1.4%)
15 other large bird species	0.75 (14.4%)	0.89 (23.8%)	0.15 (2.7%)	0.07 (1.5%)
Total	*5.20 (100%)*	*3.72 (100%)*	*5.48 (100%)*	*4.18 (100%)*

Note: Mean use is the number of individuals observed per 800-m radius plot per 60-minute survey.

Source: WEST (2023).

3.3.2.1 Affected Environment[8]

For this analysis, special-status avian species are USFWS birds of conservation concern (BCCs) (USFWS 2021), BLM special-status species (BLM 2022), and IDFG species of greatest conservation need (SGCNs) (IDFG 2017, 2023).

3.3.2.1.1 SPECIES ANALYZED IN DETAIL

MVE conducted avian surveys to characterize species composition and patterns of use in and near the siting corridors (WEST 2021a, 2023) in accordance with USFWS (2012) (see Figure 3.3-4). In all, 67 bird species were recorded during project avian use surveys (WEST 2021a, 2023); an additional 12 bird species have been identified within 4 miles of the siting corridors (IDFG 2020).

As described below in Section 3.3.2.1.2 (Existing and Future Trends and Actions), despite the rapid increase in wind energy development in recent years and the likelihood this trend will continue in the future, direct mortality from collision with turbines at wind energy facilities is unlikely to pose a threat to most avian populations (AWWI 2016; Choi et al. 2020).

Large diurnal raptors are generally considered to be at the greatest risk of population-level effects from turbine collisions (AWWI 2016; Choi et al. 2020; Erickson et al. 2014; Watson et al. 2018), but nocturnal raptors such as barn owl (*Tyto alba*) and burrowing owl and smaller raptors such as the white-tailed kite (*Elanus leucurus*) may also be at risk (Conkling et al. 2022). Relatively large increases in mortality (as many as 5,000 additional deaths per year) do not appear to threaten the range-wide populations of raptors with larger, more stable populations such as red-tailed hawk and Swainson's hawk, and smaller, local populations (i.e., within a BCR) may not experience population-level effects from this level of mortality either (Conkling et al. 2022). The same study also revealed that the potential for effects to these local populations is more strongly influenced by their local population size than continental population size (Conkling et al. 2022). Even with vulnerable taxa, such as raptors, there is a high degree of variation among species in the risk of population-level effects because of differences in habitat use and behavior that affect each species' likelihood of colliding with turbines (Erickson et al. 2014; Watson et al. 2018). Although information on each species use of the RSH is provided for species recorded during project avian use surveys, the relationship between collision likelihood and bird behavior near turbines is complex and not well understood (AWWI 2016; Watson et al. 2018). Some species that fly in the RSH frequently and forage near turbines (such as red-tailed hawk) appear to have higher fatality rates, whereas other species that fly actively around wind turbines (such as common raven) appear to avoid collisions (AWWI 2016).

The species analyzed in detail in this EIS meet all three of the criteria in Table 3.3-9.

Table 3.3-9. Analysis Criteria

No.	Description
1	The species has been observed in the siting corridors or has the potential to occur in the siting corridors because breeding, foraging, or migratory stopover habitat for the species is present and the species has been recorded in similar habitats within 4 miles of the siting corridors.
2	The species has a moderate to high potential of colliding with turbines based on if and how the species uses the RSH and the frequency with which the species been detected as fatalities at existing wind energy facilities.
3	The species has one or more demographic characteristics that make it susceptible to small increases in mortality; namely, they have a small and declining population in BCR 9, are long lived, have a low reproductive rate, and are dependent on high annual survivorship to sustain their population.

[8] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

There are 35 avian species with special-status designations that have been recorded in the siting corridors or that have the potential to occur in the siting corridors (not including eagles, which are addressed in Section 3.3.3, or greater sage-grouse, which is addressed in Section 3.3.4). These species may have declining or vulnerable populations and could be at risk of population-level effects from fatalities due to collision with turbines (Watson et al. 2018). Each of these species was evaluated for its potential to experience population-level effects based on the three criteria described above. Of those species, 31 did not meet one or more of these criteria and are not analyzed further in this EIS (see Table App3-3 in EIS Appendix 3). Although these species may be affected by the project, effects would not be at the population level or substantially influence the NEPA decision. Four special-status avian species met all three analysis criteria: ferruginous hawk, long-billed curlew (*Numenius americanus*), short-eared owl (*Asio flammeus*), and western burrowing owl.

Ferruginous Hawk

Thirty-one ferruginous hawks were recorded during the first year of project avian use surveys, and 12 were recorded during the second year of avian use surveys (WEST 2021a, 2023). Ferruginous hawk use was highest in the summer (the breeding season) during the first year (WEST 2021a), but only one ferruginous hawk was recorded during summer of the second year (WEST 2023). Two active ferruginous hawk nests were identified across both years of raptor nest surveys (Table 3.3-10) (WEST 2020, 2021a, 2021b). No ferruginous hawks were recorded during the winter of the first year (WEST 2021a) or fall of the second year (WEST 2023).

Table 3.3-10. Occupied (non-eagle) Raptor Nests within 1 Mile of the Siting Corridors

Nest Number	2020 Nest Status	2021 Nest Status	Within Siting Corridors (Yes/No)
17	Ferruginous hawk, occupied-active	Ferruginous hawk, occupied-active	No
18	Unoccupied	Ferruginous hawk, occupied-active	Yes
19	Red-tailed hawk, occupied-inactive	Common raven, occupied-active	No
20	Red-tailed hawk, occupied-active	Common raven, occupied-active	Yes
31*	Burrowing owl, occupied-active	Inactive	No
32*	Burrowing owl, occupied-active	Inactive	No
33*	Burrowing owl, occupied-active	Inactive	No
34	No nest observed	Red-tailed hawk, occupied-active	Yes
35	No nest observed	Red-tailed hawk, occupied-active	No
55	No nest observed	Red-tailed hawk, occupied-active	No
59	No nest observed	Unknown raptor, occupied-inactive	No
61	No nest observed	Unknown raptor, occupied-active	No
62	No nest observed	Unknown raptor, occupied-inactive	No
66*	No nest observed	Red-tailed hawk, occupied-active	Yes
67*	Not surveyed	Burrowing owl, occupied-active	Yes
68*	Not surveyed	Burrowing owl, occupied-active	No

* Observed incidentally during other biological surveys; burrowing owl nests were not targeted during either year of survey.
Sources: WEST (2020, 2021b).
Eagle nests are summarized in Section 3.3.3 (Eagles).

Ferruginous hawks regularly fly within the RSH (WEST 2022, 2023), but few fatalities have been documented at existing U.S. wind energy facilities (13 total, or 0.1% of all recorded fatalities) (Allison and Butryn 2020). This low percentage may be in part due to the non-random nature of the facilities included in the database, which is heavily skewed toward facilities in the Midwest and eastern United States that are outside the range of the ferruginous hawk.

Long-Billed Curlew

Sixteen long-billed curlews were recorded during the first year of avian use surveys, and 88 long-billed curlews were recorded during the second year of avian use surveys. Long-billed curlew use could be higher in particularly wet years when playas and vernal pools in the siting corridors are inundated. All long-billed curlew use during the first year occurred in the spring (WEST 2021a). Long-billed curlew use was highest in the spring during the second year, but long-billed curlews were also recorded in the summer and winter (WEST 2023).

Idaho supports as much as 31% of the long-billed curlew population in BCR 9 (American Bird Conservancy 2013); the highest concentrations of curlews in Idaho occur to the west of the area managed by the SFO in the administrative boundary of the BLM Four Rivers Field Office (IDFG 2017). Although the long-billed curlew population in BCR 9 appears to be increasing, the species is in decline throughout much of its range (Sauer et al. 2019), and some have raised questions as to the validity of this trend (IDFG 2017). Given the importance of the local breeding population in Idaho to the overall population of long-billed curlews in BCR 9, the possibility that even a relatively low fatality rate could result in a population decline in BCR 9 cannot be ruled out.

Short-Eared Owl

The avian use surveys were not designed to detect owls. However, during the first year of avian use surveys, 17 individuals were recorded at three point count locations; use occurred in all seasons except winter and peaked in summer (WEST 2021a). One short-eared owl was recorded during the second year of avian use surveys, during the winter (WEST 2023).

All owl flights observed during avian use surveys were below the RSH evaluated in this EIS (WEST 2022, 2023). Most short-eared owl foraging flights occur below 10 feet, though they may hover as high as 100 feet on occasion. Males are at greater risk of turbine collisions at the onset of the breeding season when they engage in higher-altitude aerial displays over their territories to attract females (Wiggins et al. 2020).

The short-eared owl population in BCR 9 is small (approximately 69,000 [Partners in Flight 2022]) and declining (though confidence in this trend is moderate) (Sauer et al. 2019). Assessments of the species status and conservation needs have not identified direct mortality from wind energy development as a major threat to short-eared owl populations. However, short-eared owl use during the summer breeding season was recorded during the avian use surveys, and males engaged in mating displays could be killed by turbine collisions. Given the species' low reproductive output and small, declining population, even a relatively small increase in fatalities during the breeding season could impact the short-eared owl population in BCR 9.

Western Burrowing Owl

Ten burrowing owls were recorded during the first year of avian use surveys (WEST 2021a), and eight were recorded during the second year of avian use surveys (WEST 2023). However, the avian use surveys were not specifically designed to detect owls. Burrowing owl use was highest in spring and summer, low in fall, and absent in winter (WEST 2021a, 2023). Five active burrowing owl nests were also recorded incidentally during other biological surveys in 2020 and 2021 (see Table 3.3-10) (WEST 2020, 2021b).

The BCR 9 population of burrowing owls is currently estimated to be 60,000 individuals, which is approximately 6% of the species' North American population (Partners in Flight 2022). The western burrowing owl population in BCR 9 has been decreasing since 1966 but increasing in recent years (1997–2017), though there was only a moderate confidence in these trends (Sauer et al. 2019). Given that western burrowing owls are known to breed in the siting corridors and likely depend on high reproductive output and adult survivorship to maintain their population in BCR 9, even a relatively small increase in fatalities during the breeding season, or a small reduction in reproductive output, could impact their population in BCR 9.

3.3.2.1.2 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have influenced and will continue to influence avian populations in the analysis area through habitat disturbance, introduction of invasive species, or conversion of open space to agriculture or rural residential, particularly where those actions occur in suitable habitats (shrublands, rangelands, agricultural areas, and rocky outcrops) for bird species and their prey.

There are 4,626 existing wind turbines currently operating in BCR 9, with a combined capacity of 8,647 MW (Hoen et al. 2018 [version 6.1, released November 28, 2023]; Natural Resources Canada 2022). Although accurately estimating the amount of new wind energy generation capacity that will be brought online in BCR 9 over the next 30 years is not possible, thousands of MW of new wind generation capacity will be needed to meet state and federal renewable energy goals, including the DOI's goal to permit 25 GW of onshore renewable energy on DOI lands by 2025 (see Section 1.2 [Purpose and Need]). A large portion of BLM public land that is economically developable for wind energy (as modeled by the National Renewable Energy Laboratory) falls within BCR 9 (BLM 2005), and given this, it is likely that wind energy facilities will rapidly expand in the analysis area over the next 30 years. At least two other wind energy facilities are currently proposed near the Lava Ridge Wind Project: the Taurus Wind Project, which would be immediately northwest of the Lava Ridge wind Project, and the Salmon Falls Wind Project, which would be approximately 30 miles to the south. The Taurus Wind Project would be similar in size and scale to the Lava Ridge Wind Project and has an estimated 1,500-MW generation capacity. The Salmon Falls Wind Project would be much smaller, with an estimated generation capacity of 800 MW. Although it is impossible to accurately predict the future avian fatality rates for these facilities, the cumulative impacts of numerous facilities with high fatality rates across the landscape could compound the impacts on avian populations in BCR 9.

Estimating cumulative avian fatalities from turbine collisions across large areas is difficult, but numerous studies placed the overall fatality rate in North America in 2016 at 250,000 to 500,000 birds annually, which is likely to continue increasing as wind energy development continues (Johnson et al. 2016). Although this indicates wind energy facilities in BCR 9 could be responsible for the fatality of thousands, or even tens of thousands, of birds per year, the number of birds estimated to be killed by collisions with turbines is relatively small in comparison to estimate of fatalities from other anthropogenic sources such as collisions with vehicles, buildings, transmission lines, and communication towers; exposure to pesticides and other toxic chemicals; and predation by domestic and feral cats, which together cause hundreds of millions to several billion avian fatalities in the U.S. annually (AWWI 2016; Loss 2016; National Wind Coordinating Collaborative 2010). Given this, collisions with turbines and wind energy development alone do not appear to be a threat to most avian populations (AWWI 2016; Choi et al. 2020). Even so, as the number of wind facilities increases, collisions with turbines will represent an increasingly large proportion of all collisions with humanmade structures and will have correspondingly greater effects on avian populations (National Wind Coordinating Collaborative 2010). Although the expansion of wind energy may not be the primary driver for the decline of most avian species, fatalities from turbine collisions exacerbate other impacts that have led to these declines and are becoming an increasingly important source of avian mortality. For species that are already declining, and for species with low reproductive rates, even a relatively small increase in the fatality rates could have a significant impact on their populations in the analysis area.

3.3.2.2 Impacts

3.3.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and avian populations would only be affected by existing and future trends and actions.

3.3.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect avian populations through injury or fatality due to collision with turbine blades and met towers.

BLM (2005) identifies and discusses potential effects to avian populations from turbine and met tower operation (2005:5-53–5-75), which include collisions with turbines and met towers, noise disturbance, increased predation, and interference with behavioral activities such as migration. This analysis concluded that the effect of turbine noise was minimal and would be difficult to distinguish from background noise at distances greater than 82 feet from the base of the turbine. Collision with turbines and met towers is one of the greatest potential effects to avian species from wind energy facilities and is discussed in more detail below.

The response of avian species to the construction and operation of a wind energy facility is complex and variable, making it impossible to predict the frequency of fatalities by collision from abundance data alone (WEST 2011). Species with suitable habitat near turbines and met towers are more likely to collide with these structures than those for which habitat is lacking (Conkling et al. 2022). Resident species that use the siting corridors year-round are also more likely to collide with structures than species that use the siting corridors during migration because residents fly at lower altitudes and spend more time in the area (Conkling et al. 2022; Krijgsveld et al. 2009). Turbine and met tower construction can disturb the ground, thus making it more suitable for burrowing mammals that raptors prey on, and livestock clustering near turbines can attract insects that other species prey on, which increases the risk of these species colliding with the structures (BLM 2005). Other species (e.g., LeConte’s sparrow [*Ammodramus leconteii*]) may avoid habitats disturbed by wind facilities, and thereby reduce their likelihood of colliding with operational turbines (Stevens et al. 2013). Thus, although the analysis presents overall avian and raptor fatality rates to allow for a comparison of the impacts among alternatives, only those species at greatest risk of experiencing population-level effects from turbine collisions (i.e., ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl) are analyzed in detail. Information on special-status avian species that were analyzed in brief is provided in Table App3-3 in EIS Appendix 3. Because of the variability in the potential likelihood of turbine collision within species groups, this analysis addresses risk factors for each species individually.

Turbine Collisions

Many variables may affect the overall avian fatality rate of a wind energy facility, such as topography, habitat, seasonal weather variables, and the number and size of turbines installed. Studies on the relationship between the RSH and avian fatalities have inconsistent results. Raptor fatalities have been shown to decrease (on a per MW basis) as turbine size increases, but the effect of the RSH on collision rates for most avian species remains uncertain (AWWI 2016). Larger turbines rotate at slower speeds, which may help reduce collision risk, but these larger turbines are able to operate at lower wind speeds, increasing the amount of time they are operational. The total output of a turbine (expressed in MW-hours) rather than its capacity (expressed in MW) or the size of its rotor swept area appears to be the best predictor of avian fatality rates (Smallwood and Karas 2009). Others have found that modern steel monopole turbines result in fewer avian fatalities per MW of capacity than older steel lattice turbines (Krijgsveld et al. 2009). To account for the variation in turbine types, avian fatality rates are typically presented as fatalities per MW per year rather than fatalities per turbine per year. Although there are inherent uncertainties in this approach, a detailed analysis of the relationship between turbine characteristics (such as the RSH) and avian fatalities is not possible with currently available data. The estimated avian fatality rate used in this EIS (and detailed below) was based on available data from existing wind farms, which had turbines with a mean blade height of 557 feet; this falls between the minimum (545 feet) and maximum (740 feet) blade heights proposed for the Lava Ridge Wind Project. The largest turbines included in the available data had blade heights that were slightly taller than the largest turbines proposed for the Lava Ridge Wind Project. Thus, the estimated avian fatality rates used in this EIS account for variability in the RSH. There is no indication that the size of a wind energy facility (i.e., total installed capacity) affects avian fatality rates (on a per-MW basis); however, there are no existing wind energy facilities of the size proposed under Alternative B, and it is unknown how this could affect the avian fatality rate.

To provide context and to identify geographic variation in avian fatality rates at wind energy facilities, the project's avian mortality analysis (WEST 2021c) summarizes data from postconstruction monitoring at wind energy facilities at several different spatial scales: the United States as a whole, BCR 9 (the analysis area), the USFWS Pacific Region (Oregon, Washington, and Idaho), and the EPA North American Deserts Level I Ecoregion (southern Idaho and Oregon east to the Rocky Mountains and south into the Sonoran and Chihuahuan Deserts in Mexico); see Figure 3.3-3 and Table 7 in the BBCS (Appendix M of MVE [2023]). WEST (2021c) reported fatality rates between 0.24 and 8.45 birds per MW per year with a mean fatality rate of approximately 2.7 birds per MW per year in BCR 9. Similar fatality rates were reported for the USFWS Pacific Region and the EPA North American Deserts Level I Ecoregion (WEST 2021c).

Fatality rates for all birds and raptors from existing wind energy facilities in Idaho for which data are available are presented in Table 3.3-11. As noted in Section 3.3.1.2.2 (Bat Populations and Roosting Habitat, Alternative B), there are limitations on the data collected from Meadow Creek Wind, Power County Wind, and Rockland Wind, and these data cannot be directly compared with the data from Horse Butte Wind and other facilities included in WEST (2021c). In particular, the data presented for Power County Wind and Rockland Wind were collected during timeframes specifically targeted to capture periods of peak bat use and may underestimate avian fatalities because they do not fully cover spring and fall avian migration periods when avian use in the region is highest. However, the average avian fatality rate at Horse Butte Wind across all 3 years of study was 2.7 birds per MW per year, which is the same as the average reported for BCR 9.

It is impossible to accurately predict the fatality rate for the Lava Ridge Wind Project because preconstruction use is not correlated with postconstruction fatality rates (WEST 2011). For comparison among action alternatives, this EIS estimates bird fatalities that could occur based on the mean fatality rate for BCR 9 (2.7 birds per MW per year). This EIS also presents the number of fatalities that could occur based on the maximum fatality rate observed in BCR 9 (8.5 birds per MW per year) (Table 3.3-12). Since Alternative B has the highest potential generation capacity of the action alternatives, it could result in the most bird fatalities and the greatest impacts to avian populations in BCR 9.

Table 3.3-11. Avian Fatality Rates for Existing Wind Energy Facilities in Idaho

Facility Name and Generation Capacity	Location and Distance from Siting Corridors	Study Period	Avian Fatality Rate (all birds)	Avian Fatality Rate (raptors only)	Estimated Annual Fatalities*	Data Limitations
Horse Butte Wind 57.6 MW	Idaho Falls, Idaho 110 miles northeast	September 27, 2012–September 12, 2013	1.94 fatalities/MW/year	Not reported; large bird fatality rate was 0.54 fatalities/MW/year	All species: 112	None. Study followed standard protocols and is included in databases.
		September 25, 2013–September 24, 2014	3.45 fatalities/MW/year	Not reported; not enough fatalities to accurately calculate large bird fatality rate	All species: 199	None. Study followed standard protocols and is included in databases.
		October 1, 2014–September 23, 2015	2.60 fatalities/MW/year	Not reported; not enough fatalities to accurately calculate large bird fatality rate	All species: 150	None. Study followed standard protocols and is included in databases.
Meadow Creek Wind 120 MW	Idaho Falls, Idaho 110 miles northeast	April 2, 2013–March 31, 2014	3.21 fatalities/MW/year	Not enough fatalities to accurately calculate; large bird fatality rate = 0.42 fatalities/MW/year*	All species: 385	Data collected from a non-random sample of turbines near the highest quality habitat at the project. Only 1 year of data collected.
Power County Wind 45 MW	American Falls, Idaho 55 miles east	April 19, 2012–October 31, 2013	0.84 fatalities/MW/year	0 fatalities	All species: 38	Only 6 months of data collected.
Rockland Wind 79.2 MW	American Falls, Idaho 45 miles east	July 16, 2012–September 30, 2012	Not enough fatalities to accurately calculate	Not enough fatalities to accurately calculate	All species: no data	Data only collected during a 10-week focal window for peak bat migration.
		July 16, 2013–September 30, 2013	0.41 fatalities/MW/year	0 fatalities	All species: 32	Data only collected during a 10-week focal window for peak bat migration.
		July 16, 2014–September 30, 2014	0.97 fatalities/MW/year	Not enough fatalities to accurately calculate	All species: 77	Data only collected during a 10-week focal window for peak bat migration.

Sources: Hallingstad et al. (2013); SWCA (2015); Tetra Tech (2014, 2015).

* For all studies, there were too few raptor fatalities to calculate a raptor fatality rate.

Table 3.3-12. Summary of Estimated Bird Fatalities by Action Alternative

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated generation capacity in MW	1,200–2,094	1,134–1,554	840–1,074	807–1,164	723–1,205
Number of met towers*	Permanent: 5 (260– 460 feet tall) Temporary: 19 (up to 460 feet tall, 2–3 years)	Permanent: 5 (260–460 feet tall) Temporary: 19 (up to 460 feet tall, 2–3 years)	Permanent: 4 (260–460 feet tall) Temporary: 13 (up to 460 feet tall, 2–3 years)	Permanent: 4 (260–460 feet tall) Temporary: 13 (up to 460 feet tall, 2–3 years)	Permanent: 4 (260–460 feet tall) Temporary: 13 (up to 460 feet tall, 2–3 years)
Estimated bird fatalities per year from met tower collisions* (construction)	All self-supported: 12 All guyed: 168–192	All self-supported: 12 All guyed: 168–192	All self-supported: 8.5 All guyed: 119–136	All self-supported: 8.5 All guyed: 119–136	All self-supported: 8.5 All guyed: 119–136
Estimated bird fatalities per year from met tower collisions* (operation)	All guyed: 35–40	All guyed: 35–40	All guyed: 28–32	All guyed: 28–32	All guyed: 28–32
Estimated bird fatality rate from met tower collisions	Self-supported: 0.5 birds per tower per year Guyed: 7–8 birds per tower per year	Same across action alternatives	Same across action alternatives	Same across action alternatives	Same across action alternatives
Estimated bird fatalities per year from turbine collisions (operation only)	**Mean:** All species: 3,240–5,654 Diurnal raptors only: 156–272 **Maximum:** All species: 10,200–17,799 Diurnal raptors only: 348–607	**Mean:** All species: 3,062–4,196 Diurnal raptors only: 147–202 **Maximum:** All species: 9,639–13,209 Diurnal raptors only: 328–451	**Mean:** All species: 2,268–2,900 Diurnal raptors only: 109–140 **Maximum:** All species: 7,140–9,129 Diurnal raptors only: 244–311	**Mean:** All species: 2,179–3,143 Diurnal raptors only: 105–151 **Maximum:** All species: 6,860–9,894 Diurnal raptors only: 234–338	**Mean:** All species: 1,952–3,254 Diurnal raptors only: 94–157 **Maximum:** All species: 6,146–10,243 Diurnal raptors only: 210–350
Estimated bird fatalities for project life from turbine collisions	**Mean:** All species: 97,200–169,620 Diurnal raptors only: 4,680–8,160 **Maximum:** All species: 306,000–533,970 Diurnal raptors only: 10,440–18,210	**Mean:** All species: 91,860–125,880 Diurnal raptors only: 4,410–6,060 **Maximum:** All species: 289,170–396,270 Diurnal raptors only: 9,840–13,530	**Mean:** All species: 68,040–87,000 Diurnal raptors only: 3,270–9,330 **Maximum:** All species: 214,200–273,870 Diurnal raptors only: 7,320–9,330	**Mean:** All species: 65,370–94,290 Diurnal raptors only: 3,150–4,530 **Maximum:** All species: 205,800–296,820 Diurnal raptors only: 7,020–10,140	**Mean:** All species: 58,560–97,620 Diurnal raptors only: 2,820–4,710 **Maximum:** All species: 184,380–307,290 Diurnal raptors only: 6,300–10,500

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated bird fatality rate from turbine collisions†	**Mean:** All species: 2.7 birds per MW per year Diurnal raptors only: 0.13 diurnal raptors per MW per year **Maximum:** All species: 8.5 birds per MW per year Diurnal raptors only: 0.29 diurnal raptors per MW per year	Same across action alternatives	Same across action alternatives	Same across action alternatives	Same across action alternatives

* Construction met towers would be a combination of self-supported and guyed towers. Operation fatalities assume permanent met towers would be guy-wire supported towers.

† Details and references for fatality rates provided in text preceding table.

Note: For Alternatives B–E, the minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 6-MW turbines. For the Preferred Alternative, the minimum estimated generation capacity is based on 3-MW turbines, and the maximum capacity is based on 5-MW turbines. Fatality estimates are based on data from WEST (2021c) and are not intended to be precise estimates but are presented to allow for a meaningful comparison between alternatives. Estimated fatality rates do not account for the implementation of mitigation measures.

Diurnal raptors are strongly affected by wind turbines, and their naturally high adult survival rate and low reproductive output increase the potential for population level impacts. MVE's avian mortality analysis reported diurnal raptor fatality rates (see Table 8 in Appendix M of MVE [2023]) between 0.01 and 0.29 diurnal raptors per MW per year at existing wind facilities in BCR 9 with a mean of 0.13 diurnal raptors per MW per year (WEST 2021c). Similar fatality rates were reported for the USFWS Pacific Region and the EPA North American Deserts Level I Ecoregion. This is slightly higher than the mean for the United States as a whole (0.11 diurnal raptors per MW per year); however, fatality rates as high as 0.77 diurnal raptors per MW per year were reported for the United States overall.

Diurnal raptor fatality rates were not reported for Horse Butte Wind; there were too few large bird carcasses during years 2 and 3 to accurately calculate a large bird fatality rate, and only six total raptor fatalities were recorded over the 3-year study (2 red-tailed hawks, 2 Swainson's hawks, and 2 rough-legged hawks) (SWCA 2015). No raptor fatalities were recorded at Power County Wind (Hallingstad et al. 2013), and there were too few raptor fatalities at Rockland Wind to accurately calculate a fatality rate for raptors only (Tetra Tech 2014, 2015) (see Table 3.3-11). As previously noted, the data for Power County Wind Rockland Wind must be interpreted with caution because fatalities were only recorded during narrow windows.

The estimated diurnal raptor fatalities for the Lava Ridge Wind Project were calculated based on the mean (0.13 diurnal raptors per MW per year) and maximum (0.29 diurnal raptors per MW per year) rates observed at existing wind facilities in BCR 9 (see Table 3.3-12). The estimated diurnal raptor fatalities are a subset of the total bird fatality estimates, not additive. Since Alternative B has the highest range of generation capacities, it would be expected to result in the highest diurnal raptor fatality rate of the action alternatives and would have the greatest impacts on diurnal raptor populations in BCR 9.

The fatalities described in Table 3.3-12 would be spread across different avian species that may use the siting corridors. Because of the high degree of variation in collision likelihood among species described above, some species may experience few, if any, collisions with operational turbines, whereas other species may experience hundreds or thousands of fatalities from turbine collisions each year. Fatality rates for all avian species would be greatest under Alternative B because it would have the highest overall avian fatality rates. Due to the degree of variability among species and among individual wind energy facilities, preconstruction avian use is a poor predictor of avian fatality rates observed following construction (WEST 2011). Therefore, it is difficult to predict fatality rates for individual avian species; instead, this analysis relies on the pattern of avian fatalities observed at existing U.S. wind energy facilities to inform a qualitative discussion of the magnitude of impacts to individual species, focusing on species of concern.

As described in the affected environment, most of the fatalities that would occur from turbine collisions would likely be small passerine species that have a low likelihood of experiencing population-level effects from these fatalities. Horned lark is the most recorded fatality at existing U.S. wind energy facilities; it accounts for more than 13% of all recorded fatalities, which is more than twice the rate of the next most recorded species, mourning dove (*Zenaida macroura*). Other small birds commonly recorded as fatalities at existing U.S. wind energy facilities that have the potential to occur in the siting corridors include western meadowlark (5^{th} most common fatality) and red-winged blackbird (*Agelaius phoeniceus*) (10^{th} most common fatality) (Allison and Butryn 2020). These four species would likely account for most avian fatalities, and Alternative B would result in more fatalities of these species than any of the other action alternatives. Although this could translate to thousands of fatalities each year (see Table 3.3-12) for species like horned lark, this would still represent a relatively small source of mortality for these species. These four species are common, and the potential for population-level effects is low. Many other passerine species may occur in the siting corridors, but very small numbers of these species have been recorded as fatalities at existing U.S. wind energy facilities, and thus very few fatalities of these species would be expected due to the project. Therefore, the potential for population-level effects is low. Special-status passerine species may have small or declining populations that are vulnerable to small increases in mortality and were analyzed individually for their potential to experience population-level effects (see Table App3-3 in EIS Appendix 3). Although effects to these eight species may occur (as analyzed and described in Table App3-3 in EIS Appendix 3), none of these species would be expected to experience a readily detectable population decline in BCR 9.

Although large non-passerine birds account for less than 40% of the fatalities observed at existing U.S. wind energy facilities (Allison and Butryn 2020), some species have a particularly high likelihood of colliding with turbines, e.g., red-tailed hawk, American kestrel (*Falco sparverius*), and turkey vulture (*Cathartes aura*). These species are the 6th, 7th, and 8th most common fatalities (respectively) at existing U.S. wind energy facilities, each accounting for roughly 2.5% of all recorded fatalities. All three species were recorded during project avian use surveys, and they would likely account for most non-passerine fatalities from collision with turbines. Alternative B would result in more fatalities of these species than any of the other action alternatives because it would have the most avian fatalities overall. This could translate to dozens of fatalities per year (see Table 3.3-12) for species like red-tailed hawk, but this species has a large, increasing population in BCR 9 (Sauer et al. 2019), and recent genetic studies indicate that red-tailed hawks are unlikely to be vulnerable to regional population declines from increasing wind energy development (Conkling et al. 2022). The same study found that American kestrel populations are unlikely to be vulnerable to mortality from collision with turbines, and their population in BCR 9 remains large despite recent declines (Sauer et al. 2019). Turkey vultures have a large, stable population and are not threatened by mortality at wind energy facilities (Cannings 2002).

As with passerines, many other large bird species may occur in the siting corridors. Although some of these species have been recorded as fatalities at existing U.S. wind energy facilities, many have not, and few (if any) fatalities would be expected for these species. For those large birds that have been documented as fatalities at existing U.S. wind energy facilities, most do not carry special-status designations and are assumed to have relatively large and stable populations in BCR 9. Although Alternative B would result in the largest number of fatalities for non-special-status large bird species, the potential for population-level effects would be low for the reasons described above: their populations are assumed to be large and stable, and they do not frequently collide with turbines at existing wind farms. Special-status large bird species may have small or declining populations that are vulnerable to small increases in mortality. Because of the degree of variability in collision likelihood among species, special-status large bird species were analyzed individually for their potential to experience population-level effects (Table App3-3 in EIS Appendix 3). Though effects to these large bird species may occur (as analyzed and described in Table App3-3 in EIS Appendix 3), most of these species are not expected to experience a readily detectable population decline in BCR 9. Four of these species—ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl—were determined to be at risk of population-level effects and are analyzed in detail below.

Although turbine collisions are not considered to be a threat to the populations of most avian species (AWWI 2016; Choi et al. 2020), most avian species are afforded protection under the MBTA. The USFWS does not currently have a formal mechanism for permitting incidental take of migratory birds at wind energy facilities. However, the USFWS has developed land-based wind energy guidelines (USFWS 2012) to provide wind developers with a system to evaluate potential impacts on species of concern and to avoid costly mitigation or potential criminal liabilities and fines (Rose 2015). These guidelines recommend a tiered study approach, beginning with preliminary site evaluation (Tier 1) and site characterization (Tier 2), followed by preconstruction wildlife baseline studies (Tier 3), and where appropriate, postconstruction monitoring (Tier 4 and 5). MVE has conducted Tier 1–3 studies, has a draft BBCS (Appendix M of MVE [2023]) in accordance with the USFWS (2012) guidelines, and has committed to a minimum of 2 years of postconstruction monitoring surveys to meet the Tier 4 study requirements. Tier 4 studies would be used to determine if the fatality rates and potential for population-level effects predicted from the Tier 3 studies are accurate, and to provide a basis for determining if adaptive management measures need to be implemented to reduce avian fatalities.

The project has been sited outside of major flyways for migratory birds; features that concentrate raptor migration (such as prominent ridgelines) are not present. In coordination with the BLM and USFWS, MVE has adjusted the siting corridors to avoid or minimize the placement of infrastructure in areas known to be occupied by avian species of concern (e.g., golden eagle [Section 3.3.3] and greater sage-grouse [Section 3.3.4]) (see EIS Section 2.3.4, Avoidance and Minimization, and Appendix M of MVE [2023]). Turbines have been sited to reduce the risk of avian collisions to avoid occupied golden eagle and ferruginous hawk nests, and to avoid riparian areas and wetlands to the extent practicable (applicant-committed measures 136 and 138). Proper facility and turbine siting can lead to lower avian fatality rates, as would be expected for the Lava Ridge Wind Project. This reduction may already be accounted for in the avian fatality estimates presented in Table 3.3-12 because the estimates are based on fatality averages across numerous existing wind energy facilities, and thus, may already account for variability in siting considerations (e.g., other wind facilities may have also sited their turbines to avoid known raptor nests).

Avian fatalities could be reduced through measures that limit turbine operations, such as feathering turbine blades and curtailment, which are described in the bat populations analysis (see Section 3.3.1.2 [Bat Populations and Roosting Habitat, Impacts]) and in EIS Appendix 4. Turbine blades would be feathered to prevent them from rotating or to greatly reduce their rotational speed when winds are below the manufacturer's cut-in speed (i.e., the speed at which wind turbines begin generating electricity; applicant-committed measure 160). However, this measure is primarily targeted at reducing bat fatalities during fall migration and is not as effective at reducing avian fatalities. Adaptive management (applicant-committed measure 157) would be implemented if the results of postconstruction fatality monitoring indicate additional measures to minimize fatalities are warranted. Triggers for adaptive management may include levels of mortality for a bird species of concern that could result in population-level impacts based on best available science, or mass casualty events where more than 10 fatalities are recorded at a turbine during a single search. A curtailment strategy (applicant-committed measure 158) would only be implemented if other adaptive management measures (such as additions to or modifications of anti-perching/nesting devices, providing carcasses to the USGS for study, and providing funding for research and conservation efforts) are unsuccessful at reducing impacts.

Curtailment strategies have not been effective at reducing most avian fatalities (especially for smaller birds) at wind facilities where they have been implemented (Smallwood and Bell 2020) but can reduce fatalities for some raptors (AWWI 2016). Detector-based systems that use cameras and other sensors to detect large birds near operational turbines and trigger acoustic deterrents or curtailment have shown promising results for eagles (33%–63% reduction in eagle fatalities at turbines equipped with detectors) but involved small sets of turbines and thus cannot be extrapolated to estimate facility-wide fatality reductions (H.T. Harvey & Associates 2018; McClure et al. 2021). These systems were only evaluated for effectiveness at reducing collisions by eagles (that can have wingspans greater than 7 feet), and it is unknown whether these systems would be effective at reducing fatalities for bird species with smaller wingspans. Detector-based systems may also be costly, especially when considering long-term maintenance and repair costs. The curtailment options presented in the project BBCS (Appendix M of MVE [2023]) also include the use of biological monitors during periods of peak risk to allow turbines to be manually curtailed when raptors or other species of concern are observed near the operational turbines. This option can also be costly, and initial assessments indicate automatic detector-based curtailment is more effective than curtailment using biological monitors (McClure et al. 2021). Continued monitoring (applicant-committed measure 159) would determine if curtailment has been successful at reducing avian fatalities (see the BBCS in Appendix M of MVE [2023]) and to identify residual impacts that need to be addressed through compensatory mitigation (see Section 3.3.2.4).

The curtailment strategy would be developed in coordination with the USFWS, IDFG, OSC, and the BLM and would define standard operating procedures for operation during different seasons (i.e., migratory periods) and different times of day. The standard operating procedures would describe how operations staff would monitor for the presence of raptors around turbines, how the decision to curtail specific turbines would be made, and how the curtailment would be implemented. This plan would allow individual or small sets of turbines to be curtailed without substantially changing the operation of the remaining turbines. The curtailment strategy would describe the type and number of detection devices required to successfully implement the strategy and would identify how fatalities would be monitored and when adjustments would be necessary to further reduce fatalities.

Additional mitigation required by BLM policy (Table 3.3-13; also see measure K in Table App4-3) would require that MVE equip aboveground facilities (buildings and other structures where birds could perch or nest) with structures or devices that discourage perching or nesting of raptors and ravens. These devices could lead to reduced raptor use of the structures, which may reduce raptor collisions with turbines near structures equipped with these devices.

The eagle take conservation requirements would be governed solely by a USFWS-issued take permit (if the USFWS decides to issue the permit) and curtailment for eagles, if required, would be in addition to any curtailment strategy developed for other species (see Section 3.3.3, Eagles). The BLM will complete consultation with the USFWS for the ESA-listed yellow-billed cuckoo (*Coccyzus americanus*) (see Table App3-3 in EIS Appendix 3) before the ROD is issued. Any curtailment strategy must be consistent with all applicable laws including, without limitation, the MBTA.

Applicant-committed measures and required mitigation that address other sources of fatality (e.g., collision with collector and transmission lines), impacts from construction, or reduce development in special-status species habitat would have no effect on bird fatalities from turbine collisions.

Ferruginous Hawk

Modeling indicates that collisions with turbines have a relatively large contribution to overall mortality for ferruginous hawks, and that the species is vulnerable to population-level effects from wind energy development (Beston et al. 2016). Alternative B could result in 156 to 607 raptor fatalities each year due to collisions with turbines (see Table 3.3-12). Although most of the raptor fatalities would likely be red-tailed hawks, some ferruginous hawk fatalities could occur each year. Since ferruginous hawks typically hunt from perches, they have a lower likelihood of collision than raptors that hunt on the wing, but non-foraging flights often occur within the RSH. Although no turbines would be constructed within 1 mile of the two active ferruginous hawk nests identified during project raptor nest surveys (applicant-committed measure 138), this would minimize collision risk in a very small portion of the siting corridors. Although the individual ferruginous hawks occupying these nests may benefit from this buffer if they continue to use these nests, this measure is unlikely to benefit other ferruginous hawks in the siting corridors. Should either of these nests be relocated following construction, or should other ferruginous hawks construct nests in or near the siting corridors following construction, there would be no formal mechanism in place to limit turbine operation near these nests. Overhead collector line and transmission line structures constructed for the project could attract ferruginous hawks, which often construct nests on these types of structures. Thus, there could be an increase in ferruginous hawk nesting in the siting corridors following construction, which could lead to increased ferruginous hawk fatalities from turbine collisions. MVE would bury collector lines underground where practicable and would construct any overhead lines in compliance with Avian Power Line Interaction Committee (APLIC) (2006) guidelines to reduce the potential for ferruginous hawks and other raptors to nest on these structures and would maintain any nesting deterrent devices as part of standard operation and maintenance (applicant-committed measures 29, 30, and 149). Tubular structures would be used for overhead collector lines where practicable to further reduce the potential for raptor nesting (applicant-committed measure 143). The BLM would require MVE to equip all aboveground facilities (including buildings and other structures where birds could perch or nest) with structures or devices that discourage perching or nesting of raptors (BLM-required measure K). These measures would minimize the potential for ferruginous hawk nesting to increase in the siting corridors following construction and would reduce the risk of breeding ferruginous hawks and recently fledged juveniles from colliding with operational turbines.

Over the 30-year operation phase, ferruginous hawks could nest, or attempt to nest, elsewhere in the siting corridors and surrounding 1 mile (especially on new transmission structures); however, without the additional minimization measures described below, no mechanism would be in place to monitor for new nests or to adjust operations when nesting raptors are present in the siting corridors. Even if a large number of turbine collisions do not occur, turbines may indirectly impact ferruginous hawk populations (through habitat loss or alteration and reduced habitat quality, as described in AIB-1 in EIS Appendix 3) by leading to reduced nest success and increased predation and starvation of juveniles.

MVE would complete a minimum of 2 years of postconstruction monitoring (applicant-committed measure 150) to assess the actual ferruginous hawk fatality rate and to determine which adaptive management measures in the BBCS (applicant-committed measure 157) need to be implemented to reduce ferruginous hawk fatalities, if any. Adaptive management options such as providing carcasses for study or funding research and conservation efforts for ferruginous hawk would not directly reduce turbine collisions. Curtailment (applicant-committed measure 158) can be effective at reducing raptor collisions with operational turbines, but unless detector-based systems are developed in the future that are effective at reducing non-eagle collisions, biological monitors would be needed to direct operators to curtail specific turbines when ferruginous hawks are in the vicinity. Otherwise, curtailment would have to be broadly applied across large numbers of turbines during periods of higher risk (such as the nesting season). As described in the BBCS (Appendix M of MVE [2023]), if curtailment or other adaptive management measures are implemented, additional fatality monitoring would be required to evaluate if those measures have been effective at reducing ferruginous hawk fatalities and determine if there are unresolved or residual impacts that warrant compensatory mitigation (see Section 3.3.2.4).

Long-Billed Curlew

Alternative B could result in more long-billed curlew fatalities than the other action alternatives because it would have the highest generation capacity range. Although the available data suggest that few long-billed curlew fatalities would occur, few of the facilities studied are within the long-billed curlew’s breeding range and, for this reason, more fatalities could occur than expected. Considering that Idaho supports as much as 31% of the long-billed curlew population in BCR 9 (American Bird Conservancy 2013) and that the species may use siting corridors during spring migration (when juveniles and subadults disperse to new territories), fatalities resulting from collision with operational turbines could adversely affect the long-billed curlew population in BCR 9. This would especially apply when the impact of numerous facilities across the landscape is considered (see Section 3.3.2.2.7 [Cumulative Impacts]).

MVE would complete a minimum of 2 years of postconstruction monitoring (applicant-committed measure 150) to assess the actual long-billed curlew fatality rate and to determine which adaptive management measures in the BBCS (applicant-committed measure 157) need to be implemented to reduce long-billed curlew fatalities, if any. Long-billed curlews have rarely been recorded as fatalities at existing wind facilities, and strategies for minimizing long-billed curlew fatalities have not been developed. The wingspan of long-billed curlews is less than half the size of an eagle’s, and detector-based systems may not be effective for a species of this size. The possibility of false detections and unnecessary curtailment would increase because there are many more species with wingspans similar in size to the curlew than species with wingspans similar to the eagle. Thus it would be difficult to develop a curtailment strategy (applicant-committed measure 158) for curlews because it would need to be applied broadly across large sets of turbines during periods of high risk (such as the breeding season) or biological monitors would be needed to notify operators when long-billed curlews are observed near operational turbines, which would likely be costly. It is unknown to what extent a curtailment strategy (or other adaptive management measures) would be effective at reducing long-billed curlew fatalities. As described in the BBCS (Appendix M of MVE [2023]), if curtailment or other adaptive management measures are implemented, additional fatality monitoring would be required to evaluate if those measures have been effective at reducing long-billed curlew fatalities and to determine if there are unresolved or residual impacts that warrant compensatory mitigation (see Section 3.3.2.4).

Short-Eared Owl

Alternative B could result in more short-eared owl fatalities than the other action alternatives because it would have the highest generation capacity range. Although short-eared owl fatalities are relatively uncommon at existing U.S. wind energy facilities, breeding males may be susceptible to turbine collisions when engaging in mating displays. Given that project raptor nest and avian use surveys were not designed to assess short-eared owl use or nesting, the species is likely underrepresented in the project survey data, and short-eared owl use and nesting in the siting corridors may be higher than the data suggest; thus, more fatalities may occur than expected. Since the short-eared owl population in BCR 9 is small and declining, the possibility that fatalities from collision with operational turbines could adversely affect their population in BCR 9 cannot be ruled out. This would especially apply when the impact of numerous facilities across the landscape is considered (see Section 3.3.2.2.7 [Cumulative Impacts]).

MVE would complete a minimum of 2 years of postconstruction monitoring (applicant-committed measure 150) to assess the actual short-eared owl fatality rate and to determine which adaptive management measures in the BBCS (applicant-committed measure 157) need to be implemented to reduce short-eared owl fatalities, if any. Like the long-billed curlew, short-eared owls have a much smaller wingspan than eagles, and it is unknown whether detector-based curtailment strategies would be effective for the species. If not, curtailment would need to be applied broadly across large sets of turbines during periods of high risk (such as the breeding season), or biological monitors would be needed to notify operators when short-eared owls are observed near operational turbines. These measures could be costly. It is unknown to what extent a curtailment strategy (or other adaptive management measures) would be effective at reducing short-eared owl fatalities. As described in the BBCS (Appendix M of MVE [2023]), if curtailment or other adaptive management measures are implemented, additional fatality monitoring would be required to evaluate if those measures have been effective at reducing short-eared owl fatalities and determine if there are unresolved or residual impacts that warrant compensatory mitigation (see Section 3.3.2.4).

Western Burrowing Owl

Alternative B could result in more western burrowing owl fatalities than the other action alternatives because it would have the highest generation capacity range. Although burrowing owl fatalities are relatively uncommon at most existing U.S. wind energy facilities, very high burrowing owl fatality rates were observed at one existing wind energy facility in California where a large population of breeding owls was present. Given that project raptor nest and avian use surveys were not designed to assess burrowing owl use or nesting, the species is likely underrepresented in the survey data, and burrowing owl use and nesting in the siting corridors may be higher than the data would suggest; thus, more fatalities may occur than expected. Given this, the possibility that fatalities resulting from collision with operational turbines could adversely affect the western burrowing owl population in BCR 9 cannot be ruled out. This would especially apply when the impact of numerous facilities across the landscape is considered (see Section 3.3.2.2.7 [Cumulative Impacts]).

MVE would complete a minimum of 2 years of postconstruction monitoring (applicant-committed measure 150) to assess the actual western burrowing owl fatality rate and determine which adaptive management measures in the BBCS (applicant-committed measure 157) need to be implemented to reduce western burrowing owl fatalities, if any. The western burrowing owl has the smallest wingspan of the species analyzed in this section and is least likely to benefit from detector-based curtailment strategies. Other curtailment options for western burrowing owl would require broad curtailment during high-risk periods or the use of biological monitors; these measures could be costly. It is unknown to what extent a curtailment strategy (or other adaptive management measures) would be effective at reducing western burrowing owl fatalities. As described in the BBCS (Appendix M of MVE [2023]), if curtailment or other adaptive management measures are implemented, additional fatality monitoring would be required to evaluate if those measures have been effective at reducing western burrowing owl fatalities and to determine if there are unresolved or residual impacts that warrant compensatory mitigation (see Section 3.3.2.4).

Meteorological Tower Collisions

Although most avian fatalities at wind energy facilities occur from collisions with turbines, met towers also pose a collision risk. Both self-supported and guyed met towers may be used for the project, and tower height would be similar to hub height of the selected turbines. These towers, especially those with guy wires, would pose a collision risk to birds.

A study of guyed met towers in central California concluded that guyed towers 60 to 80 m tall resulted in approximately 7 fatalities per tower per year across all species; icterids, pipits, sparrows, and horned lark accounted for 60% of fatalities, whereas night-migrating songbirds accounted for only 7% of mortalities (Kerlinger et al. 2012). Gehring et al. (2011) found a similar rate (8 bird fatalities per tower per year) for towers between 116 and 146 m tall. Self-supported met towers are associated with substantially lower fatality rates. As required by BLM (2015), self-supported structures would be used where possible to limit the use of guy wires (see measure I in Table App4-3). In addition, avian diverters would be installed and maintained on guy wires of existing or new temporary met towers, and where guy wires are necessary, appropriate guy guards would be installed at the base of the guy wires (applicant-committed measure 142).

Met tower lighting (for aviation) can also attract migratory birds during inclement weather and lead to collisions (Gehring 2007; Gehring et al. 2011). Substations and ancillary facilities that are lit for security purposes also contribute to this problem, particularly if they are located close to turbines (BLM 2005:5-62). One study of very tall (> 277 m) met towers found that avian collisions could be reduced by more than 60% by installing white strobe lights or blinking red lights on met towers, rather than a combination of blinking and non-blinking red lights (Gehring 2007). Fatality rates also tend to increase as tower height increases (Gehring et al. 2011).

Based on the range of proposed met tower heights, the expected fatality rate is likely to be close to the range reported in the available literature (7 to 8 fatalities per guyed tower per year and 0.5 fatalities per self-supported tower per year) (Gehring 2007; Gehring et al. 2011; Kerlinger et al. 2012). The number of bird fatalities expected due to collision with met towers is summarized in Table 3.3-12. However, aviation hazard lighting on met towers (and turbines) would be strobed, minimum-intensity red lights, and an aircraft detection lighting system (ADLS) would be deployed (with FAA approval) so that aviation hazard lights are only illuminated when aircraft are in close proximity (applicant-committed measures 20 and 21). Motion sensors, timers, and shielding would be used to minimize unnecessary lighting and reduce skyward light when illuminated (applicant-committed measures 22, 23, and 24). Given this, the met tower fatality rates reported in Table 3.3-12 could be reduced by more than 60%.

Although any avian species in the siting corridors could collide with met towers, the met towers would be far below the typical height at which migratory flights occur; therefore, most of the fatalities would be small passerine species that inhabit the siting corridor during at least part of the year rather than passerine nighttime migrants (Kerlinger et al. 2010). During decommissioning, the wind turbines and any remaining met towers would be disassembled and recycled or disposed of off-site, and there would be no further avian fatalities resulting from collisions with these structures.

Alternatives B and C include more met towers than the other action alternatives and therefore would result in the greatest number of avian fatalities from met tower collisions. Without the implementation of applicant-committed measures, Alternative B could result in nearly 200 avian fatalities per year from met tower collisions during construction (when additional temporary met towers are in place) and up to 40 avian fatalities per year from met tower collisions during operation (after the temporary met towers are removed). These fatality rates are several orders of magnitude smaller than the fatalities that would be expected from collisions with operational turbines and would have a very small contribution to the overall fatality rate under any action alternative. When the implementation of applicant-committed measures described above is considered, the fatality rate from met tower collisions would likely be even lower.

Alternative B with Additional Measures

As described above, MVE's primary mechanism of complying with the MBTA is to develop and implement a BBCS in conformance with USFWS (2012). However, the BLM has additional obligations to reduce impacts to species protected under the MBTA as provided in their 2010 MOU with the USFWS to promote the conservation of migratory birds, which was renewed for 5 years in February 2022 (BLM and USFWS 2022). Per the MOU, the BLM shall, at the project level, "evaluate the effects of the BLM's actions on migratory birds during the NEPA process, if any, and identify where take reasonably attributable to agency actions may have a measurable negative effect on migratory avian populations, focusing first on species of concern, priority habitats, and key risk factors. In such situations, BLM will implement approaches lessening such take … in coordination with the USFWS." Further direction regarding special-status species management is provided in BLM (2008), which instructs the BLM to "initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing of these species under the ESA."

Therefore, the measures in MVE's BBCS alone may be insufficient to meet the BLM's mandate to proactively implement conservation measures to minimize impacts to special-status species and to reduce the incidental take of migratory birds attributable to the BLM's NEPA decision and authorization of the ROW. Given this, this section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B to ensure compliance with BLM management directives. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for avian populations are summarized in Table 3.3-13 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.3-13. Mitigation for Avian Populations

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
20–24	I	m
29–30	K	p–s

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
136	–	x
138	–	u
142–143	–	w–z
149–150	–	mm
157–159	–	oo
160	–	pp

Note: All measures are detailed in EIS Appendix 4.

The additional preconstruction survey requirements described above (measures p, q, and r) would lead to an improved understanding of short-eared owl and western burrowing owl use in the siting corridors and would avoid impacts to nesting owls during construction. The likelihood of raptors colliding with turbines would be reduced by avoiding creating cover for prey near turbines (measure s). The avian and bat post construction monitoring plan (measure u) and Tier 5 study requirements for ferruginous hawk (measure x) would lead to more precise quantification of the avian fatality rates following construction. This would lead to more informed recommendations for adaptive management measures and (possibly) compensatory mitigation from the TAC (measure mm). The additional measures would also improve the effectiveness of adaptive management (if needed) by clarifying and expanding the thresholds that would trigger an adaptive management response (measure w), and by allowing the TAC to recommend, and the BLM Authorized Officer to require, the implementation of a curtailment strategy at any time (measure y).

Summary of Alternative B with Additional Measures

In summary, Alternative B has the highest range of estimated generation capacity and thus would result in the most bird fatalities and the greatest impact to avian populations in BCR 9 (see Table 3.3-12). Species that do not regularly fly within the RSH or are not well represented in the siting corridors are unlikely to collide with turbines in large numbers, and the potential for effects to these species and their populations in BCR 9 are low. Species that are common in the siting corridors (e.g., horned lark) or that regularly fly within the RSH (e.g., some diurnal raptors) have a higher likelihood of collisions and are likely to represent a substantial portion of the fatalities from the project. Although thousands of fatalities could occur each year (see Table 3.3-12), these fatalities would be spread across multiple species. Alternatives B and C would result in the greatest number of avian fatalities from collisions with met towers, but with the implementation of applicant-committed measures described above, fewer fatalities would be expected.

Based on observations at existing U.S. wind energy facilities and species abundance during project avian use surveys, small passerines, and horned larks in particular, are expected to account for most of the avian fatalities from the project. As described above, horned larks and most of the other avian species that have a high likelihood of colliding with turbines have relatively stable or increasing populations in BCR 9, and the fatalities that would occur under Alternative B would be unlikely to significantly impact their populations. For special-status species whose populations have been declining in BCR 9, the additional fatalities caused by collision with turbines would further contribute to that decline, but for most species, this contribution would be too small to notably affect their population in BCR 9. Special-status avian species that have naturally high adult survivorship, low reproductive output, or other life history traits that make them vulnerable to increased mortality may be at risk of population-level effects if the avian fatality rates observed following construction are toward the upper end of the predicted range for Alternative B (see Table 3.3-12). Species of particular concern are ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl.

As recommended in USFWS (2012), MVE completed preconstruction site characterization studies and impact assessments to inform project siting, and would avoid turbine placement within 1 mile of occupied ferruginous hawk nests. MVE has committed to a minimum of 2 years of postconstruction avian fatality monitoring as well as adaptive management and curtailment based on results of that monitoring. Curtailment strategies that incorporate detection-based systems could be effective at reducing fatalities of raptors and other large birds but would be unlikely to benefit smaller passerine species. Other adaptive management measures such as providing carcasses for study or funding avian research and conservation would not reduce fatalities but may offset some of the negative effects. Therefore, the BLM would require implementation of the additional minimization measures (including additional preconstruction and postconstruction surveys and monitoring, and [potentially] curtailment within 1 mile of ferruginous hawk nests as described above) to ensure Alternative B would meet BLM management directives for special-status species and migratory birds in general. A TAC would be established to review the results of postconstruction monitoring and recommend appropriate adaptive management actions and compensatory mitigation, if warranted. The additional minimization measures would further reduce impacts to short-eared owl, western burrowing owl and ferruginous hawk, and would improve the quantification of impacts to other avian species to determine if adaptive management measures, including curtailment, need to be implemented for any species. Additional monitoring would be implemented to evaluate the effectiveness of adaptive management and determine whether compensatory mitigation (see Section 3.3.2.4) is warranted to address residual impacts.

3.3.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The range of generation capacity under Alternative C overlaps with the range for Alternative B, though the maximum generation capacity would be reduced by 26% (see Table 3.3-12). Given this, the number of bird fatalities that would occur from collisions with turbines and the corresponding effects to avian populations in BCR 9 would be similar to, but less than, Alternative B.

Under Alternative C, the added generation capacity of the project could be as much as 18% of the existing wind capacity in BCR 9. Although this would be lower than Alternative B, it would still be a substantial increase in generation capacity and associated fatalities in BCR 9. The potential for significant impacts remains for species susceptible to relatively small increases in mortality (i.e., ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl). Alternative C would implement the same mitigation measures as Alternative B with Additional Measures, including postconstruction monitoring and adaptive management (including curtailment), as necessary. Additional monitoring would be implemented to measure the effectiveness of adaptive management measures and determine whether compensatory mitigation (see Section 3.3.2.4) is warranted to address residual impacts.

Alternative C would include the same number of met towers as Alternative B. However, as with Alternative B, the number of avian fatalities expected from met tower collisions would be very small.

3.3.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The maximum generation capacity under Alternative D would be 49% less than the maximum capacity under Alternative B, and the minimum generation capacity would be reduced by 30%, which would lead to a commensurate reduction in avian fatalities from collisions with turbines and the corresponding effects to avian populations in BCR 9.

Although this alternative has a lower potential to impact avian populations in BCR 9 than Alternatives B and C, without the implementation of minimization measures, it could still result in thousands of bird fatalities from collisions with operational turbines each year, several hundred of which would be raptors. For species that are particularly sensitive to increased mortality (i.e., ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl), the effect on their populations in BCR 9 could still be significant, though the likelihood of significant effects would be much reduced. Alternative D would implement the same mitigation measures as Alternative B with Additional Measures, including postconstruction monitoring and adaptive management (including curtailment), as necessary, which would reduce the potential impacts to avian populations. Additional monitoring would be implemented to measure the effectiveness of adaptive management measures and determine whether compensatory mitigation (see Section 3.3.2.4) is warranted to address residual impacts.

Alternative D would substantially reduce the potential generation capacity of the project, which would also limit the project's contribution toward meeting state, federal, and DOI renewable energy goals. Thus, additional renewable energy projects in other locations would likely be considered. If wind energy facilities are constructed elsewhere in BCR 9 to make up for the reduced generation capacity of the project, there may be little to no net benefit on avian populations from reducing the project's generation capacity.

Alternative D, Alternative E, and the Preferred Alternative would have fewer met towers than Alternatives B and C and thus would result in fewer avian fatalities from met tower collisions, though few fatalities would occur from met towers under any alternative.

3.3.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The range of generation capacity under Alternative E would be nearly identical to the range for Alternative D, though the minimum capacity would be slightly lower, and the maximum capacity would be slightly higher. Alternative E would implement the same mitigation measures as Alternative B with Additional Measures, including postconstruction monitoring and adaptive management (including curtailment), as necessary. Therefore, the number of bird fatalities that would occur from collisions with turbines and the corresponding effects to avian populations in BCR 9 would be similar to Alternative D. Additional monitoring would be implemented to measure the effectiveness of adaptive management measures and determine whether compensatory mitigation (see Section 3.3.2.4) is warranted to address residual impacts.

As with Alternative D, substantially reducing the capacity of the project could increase impacts elsewhere in the analysis area.

Alternative D, Alternative E, and the Preferred Alternative would have fewer met towers than Alternatives B and C, and thus would result in fewer avian fatalities from met tower collisions, though few fatalities from met towers would occur under any alternative.

3.3.2.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative has a slightly higher maximum generation capacity than Alternatives D and E but has the lowest minimum generation capacity of any action alternative. Therefore, of the action alternatives, the Preferred Alternative could have the lowest avian fatality rate and least impact on avian populations in BCR 9. However, the Preferred Alternative could result in greater impacts than Alternatives D and E depending on the final design of the facility and its generation capacity. The Preferred Alternative would implement the same mitigation measures as Alternative B with Additional Measures, including postconstruction monitoring and adaptive management (including curtailment), as necessary. Additional monitoring would be implemented to measure the effectiveness of adaptive management measures and determine whether compensatory mitigation (see Section 3.3.2.4) is warranted to address residual impacts.

As with Alternatives D and E, substantially reducing the capacity of the project could increase impacts elsewhere in the analysis area.

Alternative D, Alternative E, and the Preferred Alternative would have fewer met towers than Alternatives B and C, and thus would result in fewer avian fatalities from met tower collisions, though few fatalities from met towers would occur under any alternative.

3.3.2.2.7 CUMULATIVE IMPACTS

As described in Section 3.3.2.1.2 (Existing and Future Trends and Actions), there is currently 8,647 MW of installed wind energy capacity in BCR 9, and wind energy generation in BCR 9 is expected to increase substantially over the next 30 years. At least two other large wind energy facilities are proposed near the Lava Ridge Wind Project. The potential effects of the expansion of wind energy on avian populations in BCR 9 would depend on a host of site-specific variables at each project location, the number and size of turbines that would be used, the implementation and effectiveness of applicant-committed measures, and other mitigation measures to reduce impacts to birds. The monopole turbines used at wind energy facilities today are much taller than the small lattice tower turbines that were installed in the past, and turbine generation capacity, height, and blade length are likely to continue increasing as the technology advances further. Determining the relationship between the type or size of turbines used and avian fatality rates has proven difficult (AWWI 2016; Smallwood and Karas 2009). Some evidence shows that avian fatalities decrease as turbine height increases (Baerwald and Barclay 2009; Barclay et al. 2007). Conversely, other studies have found higher fatality rates at taller turbines, and the longer blades and larger rotor-swept area associated with taller turbines may also increase fatality rates (Loss et al. 2013). Recent research indicates that turbine size and design did not affect avian fatality rates (Huso et al. 2021); the same study found that avian fatality rates are closely correlated with the overall output of wind energy facilities (i.e., megawatt hours), not generation capacity (total MW). Ultimately, the study concluded that it is unlikely that avian fatality rates at future wind energy facilities will decrease as a result of changes in turbine design and that micro-siting individual turbines or turbine strings is more important for reducing fatalities than limiting the size of turbines (Huso et al. 2021).

Despite the trend toward increasing avian fatalities from wind energy, this source of mortality will remain relatively small when compared to other sources of avian mortality—such as collisions with vehicles, buildings, transmission lines, and communication towers; exposure to pesticides and other toxic chemicals; and predation by domestic and feral cats (AWWI 2016; Loss 2016; National Wind Coordinating Collaborative 2010)—and for most species, this source of mortality will be too small to have a notable effect on their populations (AWWI 2016; Choi et al. 2020). However, for some special-status avian species, when cumulative fatalities across BCR 9 are considered, there could be negative population-level effects that continue a downward trend. Thus, even though an individual wind energy facility on its own may not cause population-level effects, each facility constructed in BCR 9 over the next 30 years would further increase avian mortalities and the potential for declines in some avian populations. Thus, when evaluating the need for adaptive management measures, it is important to consider the mortality that is likely to occur at other existing and future wind energy facilities in BCR 9.

Under Alternative B, the added generation capacity of the project would represent 14% to 24% of the existing wind capacity in BCR 9. Given this, Alternative B would contribute substantially to the number of collisions with wind turbines and the effects on avian populations in BCR 9. At maximum generation capacity, Alternative B would have nearly 25% more capacity than the largest existing wind energy facility in the United States; there are only four other existing U.S. wind facilities with capacities of 800 MW or greater (Carlin 2022), though other larger facilities are under construction (i.e., Chokecherry and Sierra Madre Wind Energy Project in Wyoming). Since no projects of this size have been constructed before, it is unknown whether the fatality rate would continue to increase as the capacity of the facility increases, or if concentrating wind development in larger, but fewer, facilities will reduce the per-MW bird fatality rate. Since birds are highly mobile species that migrate long distances, they may encounter turbines less frequently if they are tightly clustered in a few small areas, rather than spread out across the landscape in many smaller-capacity facilities. Alternative B has the highest maximum generation capacity and thus is likely to contribute more to the cumulative impact of turbine collisions on avian populations in BCR 9 than the other action alternatives.

Since collisions with wind turbines would still result in a relatively small proportion of the fatalities from all anthropogenic structures (National Wind Coordinating Collaborative 2010), this is unlikely to significantly impact the population of most avian species in BCR 9, though it would add to the overall impact to these species. As wind energy capacity continues to increase in BCR 9, collisions with turbines will represent an increasingly large proportion of the avian fatalities resulting from collisions with humanmade structures and will have an increasingly large effect on avian populations. Although ferruginous hawk, long-billed curlew, short-eared owl, and western burrowing owl would likely represent a very small proportion of all avian fatalities from collisions with turbines at any wind energy facility, even this relatively small increase in fatalities may have significant impacts on their populations in BCR 9.

Alternative B would increase the total wind energy capacity in the United States by as much as 1.8% and the total capacity in the analysis area (excluding Mexico) by 14% to 24%. Although this may not lead to a directly proportional increase in avian fatalities, it illustrates the scale of the project and the number of other wind energy projects across the landscape, as well as the potential magnitude of the project's contribution to cumulative impacts on avian populations.

The other action alternatives would have a lower range of generation capacities; their proportional contribution to wind capacity in the analysis area would be as follows:

- Alternative C: 13% to 18%
- Alternative D: 10% to 12%
- Alternative E: 9% to 13%
- Preferred Alternative: 8% to 14%

However, as described above, alternatives that substantially reduce the generation capacity of the Lava Ridge Wind Project may result in additional wind energy projects being constructed elsewhere within BCR 9 in order to meet federal and state renewable energy mandates, which could result in a similar level of cumulative impacts across all the action alternatives. It is also important to note that wind energy results in approximately 0.269 avian fatalities per gigawatt-hour (GWh) of energy produced, whereas nuclear power causes approximately 0.416 avian fatalities per GWh, and traditional fossil fuel energy causes 5.18 avian fatalities per GWh (Sovacool 2013). Thus, alternatives with lower generation capacities could result in greater impacts to avian populations if other types of energy generation are used to satisfy the demand for electricity that would have been generated under alternatives with higher generation capacities.

3.3.2.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would irretrievably impact individual birds through fatalities caused by collision with turbines and met towers during the 30-year operation phase, but these effects would not be irreversible because they would be unlikely to result in a trend toward listing under the ESA or a loss of population viability. Impacts to sensitive species would be minimized through the implementation of mitigation measures.

3.3.2.4 Compensatory Mitigation

Even with the implementation of applicant-committed measures and other mitigation described above, including adaptive management measures (see EIS Appendix 4), there could be residual impacts to BLM special-status bird species. If adaptive management measures are implemented to reduce avian fatalities, additional avian fatality monitoring would be conducted to assess the effectiveness of these measures. If adaptive management does not reduce fatalities below the adaptive management threshold, compensatory mitigation would be required. The adaptive management threshold would be developed by the TAC and would be based on species' population trends and current meta-analysis of wind energy impact on birds. Appropriate compensatory mitigation measures would be identified by the TAC and would be based on the best available science and technology at that time. Final decisions regarding compensatory mitigation would be the responsibility of the BLM Authorized Officer. Potential compensatory mitigation measures currently under consideration are listed under Compensatory Mitigation Actions in the Mitigation Framework for Birds and Bats in EIS Appendix 4.

3.3.3 Eagles

The issues analyzed in detail and the approach for the analysis are detailed in Table 3.3-14.

Table 3.3-14. Analysis Approach for Eagles

Issue Analyzed in Detail	Issue 1: How would the project affect nesting and wintering eagles? Issue 2: How would the project affect populations of eagles?
Associated Issues Analyzed in Brief	AIB-3: How would the increase in project-related traffic affect the risk of direct avian mortality?
Analysis Area	The area within 109 miles of the siting corridors for golden eagle and the area within 86 miles for bald eagle (Haliaeetus leucocephalus). These areas are the geographic extents of the local area populations (LAPs) as defined in Appendix F of the Eagle Conservation Plan Guidance (USFWS 2013, using the most recent values for species-specific natal dispersal distance) (see EIS Appendix 6). The analysis of effects to eagles from potential fatality focuses on impacts at the population (eagle management unit [EMU]) and cumulative [LAP]) scale (Figure 3.3-5). The EMUs for golden and bald eagles are established at the flyway level (the project's EMU is the Pacific Flyway). The golden eagle EMU is evaluated using a further refined scale within the Pacific Flyway, termed the local area density unit (LADU). The golden eagle LAP for the project is located within the Northern Rocky Mountains and Great Basin golden eagle LADUs. The bald eagle EMU is evaluated using a further refined scale of LADUs that is unique to the species. The bald eagle LAP for the project is located within the Northern Rocky Mountains, Pacific, and Rocky Mountains and Plains bald eagle LADUs. The USFWS analyzes permitted eagle take and determines its consistency with their preservation standard (16 USC 668-668d; USFWS 2016a) at these scales.
Indicators	USFWS fatality estimates based on avian use monitoring and project design. Acres of ground disturbance in prey habitat. Miles of overhead collector lines and new and improved access roads.
Impacts Duration	The life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. The risk of direct mortality due to turbine strikes or electrocution would occur during operation, whereas mortality related to vehicle strikes or collision with met towers would occur in all project phases. Changes to prey species distribution and/or availability would occur in all project phases. Because many prey species readily use disturbed habitats, this analysis assumes that the duration for impacts to prey populations would end after reclamation activities have been completed.
Data Sources	Project avian survey and raptor nest survey reports (WEST 2020, 2021a, 2021b, 2023). USFWS fatality estimates to evaluate population effects from fatalities that result from collision with wind turbines (see EIS Appendix 6).

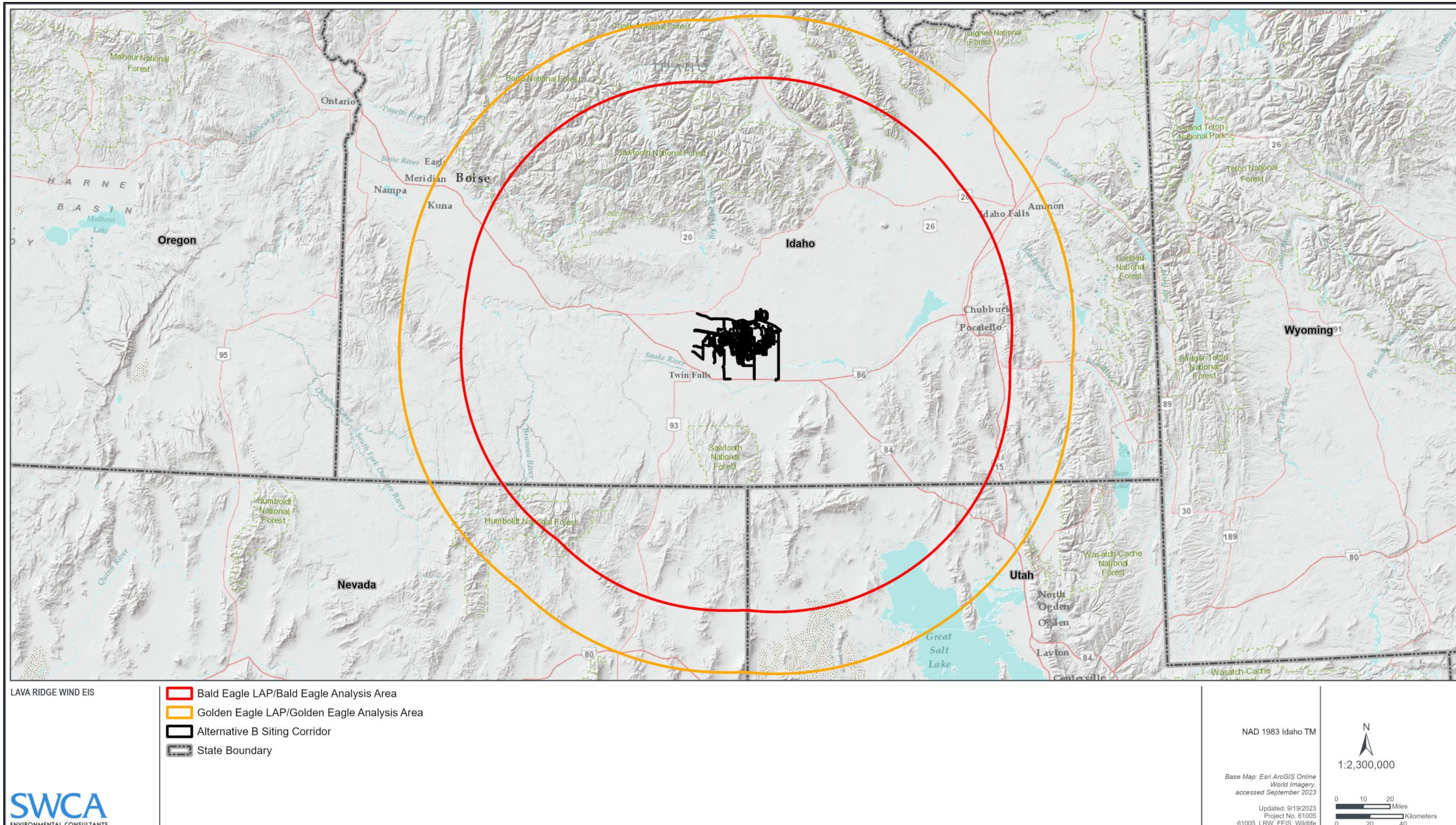

Figure 3.3-5. Eagle analysis areas.

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3.3.3.1 Affected Environment[9]

MVE conducted avian surveys to characterize species composition and patterns of use in and near the siting corridors (WEST 2021a, 2023) in accordance with USFWS (2012).

The siting corridors and vicinity generally lack suitable nesting habitat and provide limited foraging habitat for bald eagles (173 acres of intermittently filled stock ponds and 47 acres of irrigation canals). The siting corridors and vicinity do not contain suitable nesting habitat for bald eagles due to the general lack of tall trees and large open bodies of water.

Nest surveys for the project in 2020 recorded two active golden eagle nests northwest and west of the siting corridors (WEST 2020; see discussion below).

Foraging habitat for golden eagles is present in the golden eagle LAP. The siting corridors do not contain preferred nesting habitat for golden eagles due to the lack of cliffs and rugged topography, though presence of large transmission structures provides nesting opportunity.

During the 2020 nesting season, two golden eagle nests (one at Crater Butte and one west of Shoshone) and one bald eagle nest (near Wilson Lake Reservoir) were identified within 10 miles of the siting corridors; all three nests were occupied, but the golden eagle nest at Crater Butte, though “occupied,” was inactive for the 2020 breeding season (i.e., the nest was occupied, but breeding behavior was not observed) (WEST 2020). During the second 2020 survey, greenery was observed in the Crater Butte nest and an adult was perched nearby, but nesting was not recorded. The other two nests contained two nestlings in each during the second survey. The golden eagle nest first observed in 2020 at Crater Butte was revisited during the 2021 surveys, and during the second 2021 survey, the nest contained one nestling (WEST 2021b). The nest is located more than 2 miles from the siting corridors. No eagle nests were recorded within 2.5 miles of the siting corridors, likely due to the lack of suitable eagle nesting substrate (such as large trees or cliff faces) (WEST 2021b). Based on the survey results, two golden eagle breeding territories and one bald eagle breeding territory are present within 10 miles of the siting corridors, and the siting corridors provide suitable foraging habitat for golden eagles. Bald eagles may also use limited waterbodies and riparian areas for foraging, as well as carrion, though this species was not observed during project avian surveys (see discussion below).

Surveys for large birds, including eagles (described in more detail in Section 3.3.2.1.1), were conducted for the project. Golden eagle was the only eagle species recorded during the project’s first avian survey season and made up 1.9% of large bird use in the summer and less than 1.0% in all other seasons. Both bald and golden eagles were observed during the second avian survey season, with bald eagle making up less than 0.1% of large bird use in fall and winter and none in spring and summer and golden eagle making up 1.7% in the winter and less than 1.0% in the remaining seasons. Golden eagle use was observed throughout the siting corridors, with no apparent patterns of concentrated use discernable from observations, and bald eagle use was only observed at three locations. Areas of higher use were associated with transitional habitats available near residential and agricultural development.

The size of the LAPs is estimated by applying the density estimates at the finest scale available (BCR scale) to the LAP (USFWS 2016a). The golden eagle LAP is estimated to contain approximately 997 golden eagles, and the bald eagle LAP is estimated to contain approximately 123 bald eagles (see EIS Appendix 6). Recent USFWS modeling shows that golden eagle populations nationwide are either declining slightly or in the early stages of a decline since 2009 (USFWS 2016a). The nationwide population trend for bald eagle is increasing or stable.

[9] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource’s affected environment.

3.3.3.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have influenced and will continue to influence nesting eagles via changes to eagle prey distribution and foraging behavior in the LAPs through habitat disturbance and fragmentation, disturbance associated with human noise and activity, and/or conversion of open space that may affect the carrying capacity of the landscape (the number of eagles that the area can support). Approximately 6,516,285 acres (27%) and 6,155,876 acres (41%) of the analysis areas for golden and bald eagle, respectively, have been or are planned to be modified by development, cultivation, wildfire, vegetation treatments and seeding projects, and/or existing and planned renewable energy development, including planned wind projects. Permitted (by the USFWS) eagle take at the EMU scale is governed by a take limit that is compatible with maintaining an equilibrium population size equal to or greater than the population objective, which is the estimated population size in 2009. Take limits at the EMU scale are intended to prevent local extirpation of eagles—both breeding and non-breeding (USFWS 2016a). To manage cumulative impacts to local eagle populations, the USFWS developed the LAP analysis as part of their land-based wind energy guidelines (USFWS 2012). The USFWS has identified that annual permitted eagle take rates above 1% of the estimated LAP are concerning, and eagle take rates of 5% are the upper threshold of what is appropriate to authorize (i.e., permit) under the Bald and Golden Eagle Protection Act (BGEPA) preservation standard, whether offset by compensatory mitigation or not (USFWS 2016a). In the bald eagle LAP, 5% of the estimated LAP equates to 6.2 bald eagles. In the golden eagle LAP, 5% of the estimated LAP equates to 49.9 golden eagles (see EIS Appendix 6). At the time of the drafting of this EIS, the USFWS has authorized the annual take (from all permitted projects in the LAP) of approximately 1.89 golden eagles and 2.83 bald eagles and has received applications for additional eagle take at other wind projects with project-specific LAPs that overlap the Lava Ridge Wind Project’s LAP (see EIS Appendix 6 and Section 3.3.3.2.7 [Cumulative Impacts]). Take may be authorized at those projects in the future.

Unauthorized take (such as from electrocution, shooting, vehicle strikes, or lead poisoning) also influences eagle population numbers within the LAPs. Current estimates of golden eagle survival rates suggest that on average approximately 18% to 20% of golden eagles die each year, and approximately 56% of these mortalities are from anthropogenic causes. The average annual anthropogenic mortality within a LAP is approximately 10% of the population (USFWS 2016a). Major causes of anthropogenic mortality are illegal poisoning, illegal shooting, collisions (with powerlines, vehicles, and wind turbines), and electrocution (USFWS 2016a). Other causes of mortality are starvation (which is largely restricted to eagles in their first year) and intraspecific fighting (fighting among members of the same species) (USFWS 2016a). A study of satellite-tagged bald eagles from Florida indicated that the leading causes of death (in order) were starvation and disease, vehicle collisions, electrocution, and poisoning (Millsap et al. 2004). For golden eagle, annual unpermitted anthropogenic take is estimated to be approximately 8.60% of the LAP, and for bald eagle, it is estimated to be approximately 3.33% of the LAP (see EIS Appendix 6). These percentages are below the 10% benchmark for average annual unauthorized take for each species and do not suggest that recurring unauthorized take within the LAPs is negatively affecting eagle populations; however, golden eagle populations nationwide are believed to be declining (USFWS 2016a).

3.3.3.2 Impacts

3.3.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and eagles would only be affected by existing and future trends and actions.

3.3.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

BLM (2005) identifies and discusses potential impacts on eagles during construction (2005:5-41–5-45), operation and maintenance (2005:5-53–5-75), and decommissioning (2005:5-77) of a wind energy facility. These impacts include habitat loss, degradation, and fragmentation; disturbance and displacement; and collision with turbines, towers, and transmission lines. Project-specific impacts (including take as defined by the BGEPA) and new information not included in BLM (2005) are discussed in this section.

Issue 1: How would the project affect nesting and wintering eagles?

Studies of the effects of noise on nesting bald eagles are limited but generally indicate that bald eagle individuals react very differently to noise, depending on the distance to the noise source and level of habituation to anthropogenic disturbance (USFWS 2016a). Bald eagles have a demonstrated capability to adapt to human activity (Millsap et al. 2004). One study recommends avoiding explosions and other similar disturbances within 400 m of bald eagle foraging areas (Stalmaster and Kaiser 1997). The *National Bald Eagle Management Guidelines* (USFWS 2007) generally recommend setbacks of 330 and 660 feet from a nest depending on site-specific factors and the activity type. Similar studies and recommendations are not available for golden eagles, though golden eagles generally have not demonstrated the same level of adaptation to human disturbance as bald eagles, thus the effects of disturbance may be of greater magnitude (Kochert and Steenhoff 2002).

Given the distance (more than 2.5 miles) of the siting corridors from all known eagle nests, noise and activity related to project operation would unlikely adversely affect nesting eagles. Potential noise disturbance at eagle nests would be limited to the construction phase. Construction and decommissioning noise (except for blasting) would be above the ambient sound level for rangeland unpopulated areas (19.3 A-weighted decibels [dBA]) within 6.8 miles of the siting corridors (SWCA 2022); however, non-blasting noise would unlikely be startling at this distance. The known golden eagle nest west of Shoshone is more than 6.8 miles from the siting corridors and therefore would not be affected by construction noise. Noise from blasting would be up to 43.7 dBA at 3.1 miles from the siting corridors (SWCA 2022; blasting noise was modeled out to 3.1 miles for the greater sage-grouse analysis). Blasting would occur twice daily throughout construction (up to 3 years) and may be audible at this eagle nest, though the total distance that blasting noise would travel is dependent on topography and other factors, such as buildings and vegetation. Blasting noise is estimated to meet “quiet” standards (50 dBA) at 3.1 miles (43.7 dBA) from the blasting site (see SWCA [2022] for more detail). The known golden eagle nest at Crater Butte and known bald eagle nest near Wilson Lake Reservoir are located within 6.8 miles of the siting corridors and would experience construction and blasting noise.

The presence of vegetation and other management activities (such as grazing) can influence the availability of prey across space and time (Allison et al. 2017; Gartman et al. 2016). Changes in availability of prey due to habitat alteration, noise, and increased human presence may reduce productivity of breeding eagles (as well as survival of non-breeding and/or wintering eagle individuals) if prey resources may become more difficult to obtain (either by reduction in numbers or changes in distribution). During construction, foraging eagles may be disturbed by the visual presence of workers and equipment, noise, and dust and may alter the patterns of habitat use across the siting corridors and vicinity. Additionally, eagle prey species (such as black-tailed jackrabbit and cottontails for golden eagle and waterfowl for bald eagle) disturbed by human noise and activity and/or those that experience habitat alteration during construction may move out of the areas of active disturbance (see Section 3.18.1 [Wildlife Movement (non-game mammals and reptiles)] in EIS Appendix 15 for a detailed discussion on effects to general wildlife movement). Alternative B would alter up to 6,740 acres and replace up to 2,374 acres of prey habitat with infrastructure (such as roads and turbines) in the siting corridors, which would further increase existing disturbance and fragmentation of prey habitat for the life of the project (Table 3.3-15). Since the siting corridors do not contain large open bodies of water and because ground disturbance in riparian and open water habitats (i.e., bald eagle foraging habitat) would be largely avoided during final project siting, potential effects to bald eagle foraging resources would be limited.

Human activities near or in foraging areas and roost sites may prevent eagles from feeding or taking shelter, which can be a threat if no other adequate feeding or roosting sites are available. Human disturbances may also displace eagles to areas of lower human activity, and if those areas are of lower quality or are energetically costly, it may prevent eagles from sourcing enough food to replenish energy stores (Brown and Stevens 1997; Stalmaster 1976; Stalmaster and Newman 1978). The differences in behavior between bald eagles and golden eagles create varying responses to disturbance. Bald eagles appear less impacted by anthropogenic presence than golden eagles and thus can persist on landscapes with higher levels of human presence (Buehler 2000). In addition to human noise and activity, the presence of turbines may reduce habitat use and foraging activities across the siting corridors. A recent study using tagged golden eagles showed increased distance of golden eagles from turbines, particularly turbines located further inside wind facilities than peripheral turbines (Fielding et al. 2021). Although this study showed a reduced displacement effect of turbines in or adjacent to preferred habitat, overall, the results indicate a risk of foraging habitat loss within the interior of operational wind facilities.

MVE's applicant-committed measures would help avoid and minimize effects of the project on eagles (Table 3.3-16). MVE would conduct preconstruction pedestrian or aerial nest surveys in suitable habitat during the appropriate nesting time periods needed to identify new raptor nest locations and to establish the status of previously identified raptor nests (applicant-committed measure 146). During the nesting season (January 1 through August 31), MVE would avoid construction activities within 0.5 mile of any occupied golden eagle nest to the extent feasible if the nest is located within line-of-sight of project-related activities. A USFWS eagle incidental take/nest disturbance permit may be required if construction activities occur within 1 mile of an occupied golden eagle nest, or within 660 feet of an occupied bald eagle nest. Construction activities may occur within this timeframe and buffer if nest surveys determine the nest is no longer active or adults have not yet initiated nesting activities by the latest known egg-laying date for the species (applicant-committed measure 144). In addition, all construction equipment would be adequately muffled and maintained (applicant-committed measure 95), and work areas and infrastructure areas would be minimized (applicant-committed measure 1). No turbines would be constructed within 2.0 miles of an occupied golden eagle nest (applicant-committed measure 138).

MVE would restrict non-emergency maintenance or other activities in the siting corridors (such as met tower removal) to outside the eagle nesting season (January 1 to August 31) if these activities would occur within 1 mile of an occupied golden eagle nest, and MVE would adhere to the USFWS (2007) guidelines for any occupied bald eagle nest (applicant-committed measure 140). If maintenance or other activities cannot be conducted outside of the nesting season, MVE would coordinate with the USFWS.

These measures would help identify nests so they could be avoided during construction and so that turbines could be sited at least 2 miles away. The measures would also minimize human activity and noise within 1 mile of golden eagle nests during operation. Although these measures would reduce effects to eagles, some mortality is still expected, and thus compensatory mitigation would be warranted (see Section 3.3.3.4).

Table 3.3-15. Summary of Impacts to Eagles

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Fatality estimates from turbine collisions (over the 30-year operation phase)*	13.31 golden eagles per year (399.3 total golden eagles) 0.56 bald eagles per year (16.8 total bald eagle)	11.26 golden eagles per year (337.8 total golden eagles) 0.11 bald eagles per year (3.3 total bald eagles)	7.86 golden eagles per year (235.8 total golden eagles) 0.11 bald eagles per year (3.3 total bald eagles)	7.66 golden eagles per year (229.8 total golden eagles) 0.11 bald eagles per year (3.3 total bald eagles)	7.05 golden eagles per year (211.50 total golden eagles) 0.09 bald eagles per year (2.70 total bald eagles)
Ground disturbance in prey habitat	9,114 acres total: 6,740 acres work area 2,374 acres infrastructure	6,953 acres total: 5,142 acres work area 1,811 acres infrastructure	4,838 acres total: 3,714 acres work area 1,124 acres infrastructure	5,136 acres total: 3,734 acres work area 1,402 acres infrastructure	4,492 acres total: 3,500 acres work area 992 acres infrastructure
Other project components that may contribute to mortality	192 miles overhead collector lines 147 miles improved roads 486 miles new roads	148 miles overhead collector lines 117 miles improved roads 360 miles new roads	111 miles overhead collector lines 83 miles improved roads 270 miles new roads	107 miles overhead collector lines 101 miles improved roads 272 miles new roads	122 miles overhead collector lines 157 miles improved access roads 240 miles new roads

* Fatality estimates do not account for the implementation of mitigation measures.

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Issue 2: How would the project affect populations of eagles?

The project could injure or kill eagles[10] via electrocution, turbine strike, vehicle strike, collision with infrastructure, or starvation due to loss of prey resources (discussed in detail under Issue 1). Fatality estimates for mortality sources other than turbine strikes are not available. These effects are detailed below.

Because of their large wingspans, eagles can be electrocuted from contact with overhead powerlines (which occurs most frequently when eagles are perching on distribution poles) and/or can be injured or killed from collisions with powerlines and guy wires. Collision with powerlines can result in electrocution in addition to the physical trauma of collision, and electrocution occurs more frequently at distribution lines than at transmission lines. Electrocution typically results in mortality but could also result in long-term injury. Collisions with or perching on utility wires (which can result in electrocution), primarily distribution lines, contribute to anthropogenic mortality of eagles (Watts et al. 2015). Approximately 192 miles of overhead collector lines (similar to distribution lines in their general height, thickness, and voltage) would be constructed for Alternative B.

The USFWS preliminary eagle fatality model (see EIS Appendix 6) was used to evaluate the risk of eagles colliding with turbines during operation of Alternative B based on 2 years of avian use surveys. Golden eagle fatality due to collision with turbines is predicted to occur at an annual rate of 13.31 eagles per year, with a take of 399.3 golden eagles over the 30-year operation phase (see EIS Appendix 6). For bald eagle, fatality due to collision with turbines is predicted to occur at an annual rate of 0.56 eagle per year, with a take of 16.80 bald eagles over the 30-year operation phase (see EIS Appendix 6). Estimated fatality rates are based on a 6-MW turbine size; should MVE use 3-MW turbines, estimated fatality rates may be smaller, depending on the number of turbines constructed. Estimated fatality rates also do not account for the implementation of mitigation measures. Fatality of a breeding eagle (either via electrocution, turbine strike, vehicle strike, or starvation due to loss of prey resources) may result in population losses (as a result of loss of productivity of a breeding pair) in addition to the direct mortality of an individual; however, this potential loss of productivity was not included in the eagle fatality modeling conducted for collisions with turbines.

Since they are unable to take off quickly and avoid collision, eagles are also at risk for fatality from vehicle strikes after being attracted to roadsides by carcasses and other inured wildlife. Approximately 147 miles of existing roads would be improved and 486 miles of new access roads constructed under Alternative B. The presence of new roads and increased use of existing roads during the life of the project may increase the risk for vehicle strikes of eagles.

Risk of mortality of eagles from turbine strikes and electrocution would cease at the end of project operation, and risk of mortality from vehicle strikes would cease at the end of decommissioning.

MVE's applicant-committed measures and mitigation measures required by BLM policy (Table 3.3-16; see Tables App4-2 and App4-3 in EIS Appendix 4) would help avoid and minimize effects of the project on eagles. In addition to the measures listed above for Issue 1, MVE would design and construct all transmission lines and collector lines in compliance with APLIC suggested practices (APLIC 2006, 2012) (applicant-committed measure 30). Where practicable, collector lines would be buried to minimize eagle collision and electrocution risk associated with overhead lines (applicant-committed measure 29). Avian diverters would be installed and maintained on all guy wires/lines of all existing or any new temporary met towers, and where guy wires are necessary, appropriate guy guards would be installed at the base of the guy wires (applicant-committed measure 142). Self-supported structures would be used where

[10] During Government to Government consultation, the Tribes have requested that all eagles killed by this project be provided to them.

possible to limit the use of guy wires (required mitigation measure I). The BLM would restrict the construction of tall facilities to the minimum number and amount needed (required mitigation measure L). These measures would minimize the potential for collisions with overhead lines, guy wires, and tall structures.

When practicable for collector lines, MVE would use tubular structures to reduce the ability of birds to perch and to reduce risk of collision (applicant-committed measure 143). MVE would equip aboveground facilities (buildings and other structures where birds could perch or nest) with structures or devices that discourage perching or nesting of raptors and ravens (required mitigation measure K). These measures would minimize the likelihood of eagles perching or nesting on project structures, which may reduce the potential for electrocution or collision with the structures.

In general, MVE would minimize activities or conditions that may attract prey for avian predators (applicant-committed measure 156). Natural material (e.g., rock piles, woody debris) and tall vegetation (i.e., tall forbs, grass, weeds) would be removed/maintained beneath turbines to reduce shelter and forage for small mammals (that would attract large birds). All materials, parts, and equipment would be stored so they are not visible from the project to reduce shelter and forage for small mammals in the project footprint. MVE would also promptly remove all dead medium to large-sized animals and dispose them within 48 hours outside the line-of-sight of turbines. These measures would help avoid and minimize attraction of eagles to the siting corridors, which would reduce the likelihood for eagles to collide with vehicles, turbines, and overhead wires and guy wires.

Project personnel during all project phases would be required to drive 25 mph or less on non-posted project roads, be alert for wildlife, and use additional caution in low-visibility conditions when driving any vehicle (applicant-committed measure 33). Carpooling among construction workers would be encouraged to the extent practical in order to reduce the number of vehicles entering and exiting the site on a daily basis (applicant-committed measure 39). The BLM would require that MVE establish speed limits on BLM roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds (required mitigation measure N). These measures would minimize the potential for eagles to collide with vehicles.

Eagle fatality monitoring would be conducted in accordance with the terms of MVE’s eagle incidental take permit (applicant-committed measure 151). MVE would coordinate with the USFWS, BLM, IDFG, and OSC to determine whether BBCS adaptive management measures are necessary and appropriate to address impacts based on results from the postconstruction fatality monitoring (applicant-committed measures 150 and 151), incidental reporting during operation (applicant-committed measure 152), industry research, and new regulatory developments (applicant-committed measures 157). The USFWS would require an adaptive management framework as part of the eagle incidental take permit conditions (50 CFR 22.80 and 50 CFR 22.250). A curtailment plan would be considered in the instance other adaptive management measures are insufficient to minimize fatalities, and only if such efforts are demonstrated to be cost effective relative to other mitigation measures (applicant-committed measure 158).

Curtailment strategies can reduce eagle fatalities (AWWI 2016). Detector-based systems that use cameras and other sensors to detect large birds near operational turbines and trigger acoustic deterrents or curtailment have shown promising results for eagles (33%–63% reduction in eagle fatalities at turbines equipped with detectors); however, these systems involved small sets of turbines and thus cannot be extrapolated to estimate facility-wide fatality reductions (H.T. Harvey & Associates 2018; McClure et al. 2021). Detector-based systems may also be costly, especially when considering long-term maintenance and repair costs. The curtailment options presented in the project BBCS (Appendix M of MVE [2023]) also include the use of biological monitors during periods of peak risk to allow turbines to be manually curtailed if eagles are observed near operational turbines. This option can also be costly, and initial assessments indicate automatic detector-based curtailment is more effective than curtailment using biological monitors (McClure et al. 2021). Continued monitoring (applicant-committed measure 159) would determine if curtailment has been successful at reducing eagle fatalities (see the BBCS in Appendix M of MVE [2023]) and to identify any residual impacts that need to be addressed through compensatory mitigation (see Section 3.3.3.4).

A 2020 study in Wyoming determined that the probability of eagles entering within 150 m of the rotor-swept zone of a turbine varied for each turbine by month, and that collision risk is higher for some turbines during some seasons than others (McClure et al. 2021). This variation in risk is likely influenced by topography, prey resource availability, and eagle behavior (i.e., hunting versus migrating) (McClure et al. 2021). Implementation of curtailment at turbines determined to be at higher risk for collision by eagles (as identified through monitoring) may reduce the risk of eagle mortality from turbine strikes.

The avoidance and minimization measures described above would help reduce but not eliminate the potential impacts on eagles. Because of anticipated eagle fatalities, MVE would need to apply for and receive an eagle incidental take permit from the USFWS and prepare an eagle compensatory mitigation plan in order for incidental take due to collisions with turbines at the project to be lawful. See Section 3.3.3.4 (Compensatory Mitigation) for more details.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for eagles are summarized in Table 3.3-16 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.3-16. Mitigation for Eagles

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	I	m
29–30	L	p–s
33	K	x
39	N	u
95	–	w–z
138	–	mm
140	–	oo
142–144	–	pp
146	–	uu
150–152	–	–
156–159	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of this measures in addition to those included for avian species in Section 3.3.2.2.2 under Alternative B with Additional Measures would reduce the likelihood of eagle mortality from collision with met towers and would reduce the potential for disturbance, displacement, or injury of eagles (if eagles nest within 2 miles of the project during construction). Implementation of phased construction would reduce potential impacts on prey habitat and availability during the breeding season by limiting disturbance to foraging habitat during this time.

3.3.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Effects to eagles under Alternative C would be similar to Alternative B; however, direct mortality from vehicle strikes and/or electrocution would likely be reduced commensurate with the decrease in total miles of new and improved road and overhead collector lines when compared to Alternative B (see Table 3.3-15). Similarly, effects to prey habitat would also be reduced commensurate with the reduction in ground disturbance when compared to Alternative B. Since Alternative C would have fewer turbines (see Table 2.4-1), it would also take approximately 61.5 fewer golden eagles and 13.5 fewer bald eagles due to collision with turbines during project operation than Alternative B. Golden eagle fatality is predicted to occur at an annual rate of 11.26 eagles per year due to collision with turbines, with an estimated take of 337.80 golden eagles over the 30-year operation phase (see EIS Appendix 6). Bald eagle fatality is predicted to occur at an annual rate of 0.11 eagle per year due to collision with turbines, with a take of 3.30 bald eagles over the 30-year operation phase (see EIS Appendix 6). Estimated fatality rates also do not account for the implementation of mitigation measures.

Alternative C would not include turbine siting corridors in the southwest and northeast (some ancillary corridors would still be constructed), which would largely concentrate the project in areas with existing development. This shift would move the siting corridors farther from the two known golden eagle nests located northwest and west of the project and would reduce potential noise (from blasting) at these nests. Alternative C would also reduce foraging/prey availability effects for eagles in the siting corridors that would be removed under Alternative C. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures.

3.3.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Effects to eagles under Alternative D would be similar to Alternative C (see Table 3.3-15). Alternative D would further concentrate potential development by removing siting corridors to the east as well as to the west (as described under Alternative C). Similar to Alternative C, the likelihood of direct mortality would be reduced commensurate with the reduction in miles of roads and overhead collector lines. Since Alternative D would include fewer turbines (see Table 2.4-1), it is also estimated to take 163.5 and 102.0 fewer golden eagles due to collision with wind turbines over the operation phase than Alternatives B and C. Golden eagle fatality is predicted to occur at an annual rate of 7.86 eagles per year due to collision with wind turbines, with a take of 235.80 golden eagles over the 30-year operation phase (see EIS Appendix 6). Estimated bald eagle take would be the same as Alternative C. Estimated fatality rates also do not account for the implementation of mitigation measures. Effects to prey habitat would also be reduced with the reduction in ground disturbance. Since Alternative D would have less miles of roads, miles of overhead transmission lines, numbers of turbines, and acres of ground disturbance than Alternative C, effects to eagles would be fewer than those from Alternatives B and C. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures.

3.3.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Effects to eagles under Alternative E would be similar to Alternative C (see Table 3.3-15). Alternative E would further concentrate potential development by removing siting corridors to the south and to the west (as described under Alternative C). Similar to Alternative C, direct mortality would be reduced commensurate with the reduction in miles of roads and miles of overhead collector lines. Since

Alternative E would have fewer 3-MW turbines than Alternatives B, C, and D (see Table 2.4-1), it would also have a reduced estimated take of eagles due to collision with wind turbines: estimated 169.5, 108.0, and 6 fewer golden eagles over the operation phase than Alternatives B, C, and D, respectively. Golden eagle fatality is predicted to occur at an annual rate of 7.66 eagles per year, with a take of 299.8 golden eagles due to collision with wind turbines over the 30-year operation phase (see EIS Appendix 6). Estimated bald eagle take would be the same as Alternatives C and D. Effects to prey habitat would also be reduced with the reduction in ground disturbance. Estimated fatality rates also do not account for the implementation of mitigation measures.

Alternative E would not include most of the siting corridors south of Jerome, Idaho. This shift would move the siting corridors farther from the one known bald eagle nest located south of the project, outside of the construction noise area, and would reduce potential construction noise disturbance from blasting. It would also reduce foraging/prey availability effects for eagles in the portions of the siting corridors that would be removed in Alternative E. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures.

3.3.3.2.6 PREFERRED ALTERNATIVE

Effects to eagles under the Preferred Alternative would be greatly reduced compared to the other action alternatives (see Table 3.3-15). The Preferred Alternative would further concentrate potential development by removing the greatest number of siting corridors. Similar to Alternative C, direct mortality would be reduced commensurate with the reduction in miles of roads and miles of overhead collector lines. Since the Preferred Alternative would have the fewest 3-MW turbines of all action alternatives (see Table 2.4-1), and the only alternative that would implement a limitation on the largest size of turbines that would be developed, it would also have the lowest estimated take of eagles due to collision with wind turbines: estimated 264.6, 203.1, 101.1, and 95.1 fewer golden eagles over the operation phase than Alternatives B, C, D, and E, respectively. Golden eagle fatality is predicted to occur at an annual rate of 7.05 eagles per year, with a take of 211.50 golden eagles due to collision with wind turbines over the 30-year operation phase (see EIS Appendix 6). Bald eagle fatality is predicted to occur at an annual rate of 0.09 eagles per year due to collision with turbines, with a take of 2.70 bald eagles over the 30-year operation phase (see EIS Appendix 6). Estimated fatality rates also do not account for the implementation of mitigation measures. Effects to prey habitat would also be reduced with the reduction in ground disturbance. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures.

Impacts to bald eagles would be similar to Alternative E.

3.3.3.2.7 CUMULATIVE IMPACTS

As described in Section 3.3.3.1.1 (Existing and Future Trends and Actions), wind energy generation in the bald and golden eagle LAPs is expected to increase substantially over the next 30 years. At least two other large wind energy facilities are proposed near the Lava Ridge Wind Project. The potential effects of the expansion of wind energy on eagle populations in the analysis area would depend on a host of site-specific variables at each project location, the number and size of turbines and other infrastructure (overhead lines, guy wires, and new and improved roads) that would be used, and the implementation and effectiveness of mitigation measures to reduce impacts to eagles.

Alternative B would substantially contribute to the number of estimated fatalities and prey habitat effects in the LAP for both species, though to a much greater degree for golden eagle. When combined with other future renewable energy development, Alternative B may further reduce available prey habitat near known breeding areas, which would influence the distribution of prey across the landscape. If prey resources become scarce or are difficult to locate by nesting eagles due to habitat changes, lack of available prey would reduce eagle productivity. Alternative B has the highest maximum generation capacity and largest disturbance footprint of the action alternatives and thus is likely to contribute more to the cumulative eagle population and habitat effects than the other action alternatives. As wind energy capacity continues to increase in the LAPs, collisions with turbines are anticipated to contribute to an increasingly large proportion of eagle fatalities in the LAPs. Alternative C would have a proportionally smaller contribution to the cumulative impacts of estimated fatalities and prey habitat effects in the LAP for both species. The contributions of Alternative D and E to cumulative impacts would be further reduced because these alternatives would have reduced number of turbines and/or reduced turbine size and disturbance footprints from those under Alternatives B and C. The Preferred Alternative would have the least contribution to the cumulative impacts of estimated fatalities and prey habitat effects in the LAP for golden eagle of all action alternatives, and would be the same as those under Alternatives D and E.

Cumulative permitted fatalities are calculated by adding the projected annual take for each action alternative to the currently authorized annual take for each species in the LAP (1.89 for golden eagle and 2.83 for bald eagle) (see EIS Appendix 6). Cumulative eagle take is summarized in Table 3.3-17. When combined with unauthorized take estimates, the total cumulative annual permitted and unauthorized take under all action alternatives is likely to contribute to ongoing golden eagle population declines if not offset by compensatory mitigation and would be unlikely to contribute to population declines for currently stable to increasing bald eagle populations.

Table 3.3-17. Cumulative Authorized Eagle Take within the Project Local Area Populations by Action Alternative

Projected Annual Take	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Cumulative projected annual take due to collision with wind turbines (project and other authorized take combined)	15.20 golden eagles per year (1.61% of LAP) 3.39 bald eagles per year (2.80% of LAP)	13.15 golden eagles per year (1.40% of LAP) 2.94 bald eagles per year (2.39% of LAP)	9.75 golden eagles per year (1.03% of LAP) 2.94 bald eagles per year (2.39% of LAP)	9.55 golden eagles per year (1.01% of LAP) 2.94 bald eagles per year (2.39% of LAP)	8.92 golden eagles per year (0.99% of LAP) 2.85 bald eagles per year (2.30% of LAP)

3.3.3.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would result in irretrievable impacts to individual eagles from noise and increased human presence, decreased prey availability due to loss of prey habitat, and direct mortality from collisions and electrocutions. A number of mitigation measures would be implemented to minimize the potential for these effects. Effects from noise, increased human presence, and direct mortality would occur over the life of the project, which is the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. However, these effects would not be irreversible because they would be offset through compensatory mitigation required by BLM policy and MVE’s eagle incidental take permit, and thus would not result in a trend toward listing under the ESA or a loss of population-viability. The effects of reduced prey availability would also cease following decommissioning because many prey species use disturbed habitat, and would not be irreversible because much of the habitat for prey would be restored and reclaimed in the long term and because large areas of similar prey habitat would remain available in the broader landscape.

3.3.3.4 Compensatory Mitigation

The Eagle Permit Rule (50 CFR 22.220(a)(1)) requires compensatory mitigation for "any permit authorizing take that would exceed the applicable eagle management unit take limit …[which] must ensure the preservation of the affected eagle species by mitigating an amount equal to or greater than the authorized or expected take. Compensatory mitigation must either reduce another ongoing form of mortality or increase the eagle population of the affected species." As described in applicant-committed measure 155, the USFWS would be responsible for making a decision on MVE's eagle incidental take permit application and determining any compensatory mitigation necessary to address incidental take arising from collisions with turbines. Compensatory mitigation requirements may be re-evaluated every 5 years by the USFWS and could involve a number of options for the first 5-year permit administrative period (i.e., years 1 through 5), including a pole retrofit program (see Appendix T in MVE [2023] for more detail regarding the compensatory mitigation process and compensatory mitigation options). Additional measures may be identified by the USFWS during the eagle permitting process and would be described in the associated NEPA document.

3.3.4 Greater Sage-grouse

The issues analyzed in detail and the approach for the analysis are detailed in Table 3.3-18.

Table 3.3-18. Analysis Approach for Greater Sage-grouse

Issue Analyzed in Detail	Issue 1: How would the project affect sage-grouse habitat? Issue 2: How would project noise and human activity affect sage-grouse? Issue 3: How would the project affect how sage-grouse use habitat or how they move among habitats?
Associated Issues Analyzed in Brief	AIB-41: Would project ground disturbance cause the introduction and spread of weeds and other invasive plant species? How would the introduction of weeds and invasive species affect revegetation success? AIB-57: How would the potential introduction or spread of nonnative plant species affect the quality of existing wildlife habitat? AIB-59: Would dust from project roads affect vegetation, wildlife, and invertebrates?
Analysis Area	Timmerman Hills and Craters of the Moon sage-grouse habitat assessment framework (HAF) fine-scale habitat units (see Figure 3.3-6 and Table 3.3-19) (BLM 2018a, 2020). These units are biologically relevant because they cover the home range of the sage-grouse population affected by the project. The BLM has completed sage-grouse habitat assessments for these units (see Section 3.3.4.1.1 [Sage-grouse Habitat]). The analysis area effectively covers the home range of the greater sage-grouse population associated with the leks near the siting corridors and includes all seasonal use areas ([SUAs]; spring, summer, and winter habitats) within their home range (see Figure 3.3-7 and Table 3.3-20), including the movement among SUAs.
Indicators	Issues 1, 2, and 3: Distance from project infrastructure and work areas to sage-grouse leks and habitat. Issue 2: New noise levels associated with project construction, operation, and infrastructure. Issue 3: Number of turbines, met towers, and substations; miles of new roads, new fences, and new transmission lines; and other range improvements in sage-grouse SUAs. Issues 1, 2, and 3: Acres of work areas and infrastructure areas in sage-grouse SUAs (see Figure 3.3-7 and Table 3.3-20) and sagebrush habitat in General Habitat Management Areas (HMAs) (see Figure 3.3-6 and Table 3.3-19). Issues 1, 2, and 3: Functional acres of sage-grouse habitat affected based on calculations from IDFG's Habitat Quantification Tool (HQT), described in the sections below.
Impacts Duration	Approximately 84 to 86 years. This duration would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and final reclamation (50 years, the estimated time for sagebrush communities to reestablish, as described in Section 3.15.1 [Native Upland Vegetation Communities] in EIS Appendix 15).

Data Sources	IDFG greater sage-grouse spatial data (IDFG 2023). Project greater sage-grouse surveys (WEST 2020, 2021a). Vegetation cover data (National Landcover Data [NLCD]; Xian et al. 2015). BLM wildfire data (BLM 2022). BLM vegetation monitoring data (BLM 2018b). BLM sage-grouse HAF reports for Timmerman Hills and Craters of the Moon HAF units (BLM 2018a, 2020), which incorporate assessment, inventory, and monitoring (AIM) and landscape monitoring framework data (BLM 2011). IDFG HQT output to quantify impacts for the action alternatives (described below) (IDFG 2022a, provided as EIS Appendix 7).
Assumptions or Approach	MVE would implement avoidance and minimization measures to reduce impacts and would work with the BLM and the State of Idaho (Idaho Governor's Office of Energy and Mineral Resources, OSC, and IDFG) to implement the HQT (State of Idaho 2021a) to address residual impacts. The HQT would be used to identify and quantify project impacts on greater sage-grouse habitat. MVE would then work with the BLM to determine compensatory mitigation for residual impacts to result in a net conservation gain, as required in BLM (2015a). BLM (2015a) outlines a hierarchy of mitigation priorities, where projects should be designed to avoid and minimize impacts to the extent possible (mainly through project siting and seasonal restrictions for specific activities), and any remaining residual impacts should be addressed through compensatory mitigation. This is described further in Section 3.3.4.4 (Compensatory Mitigation).

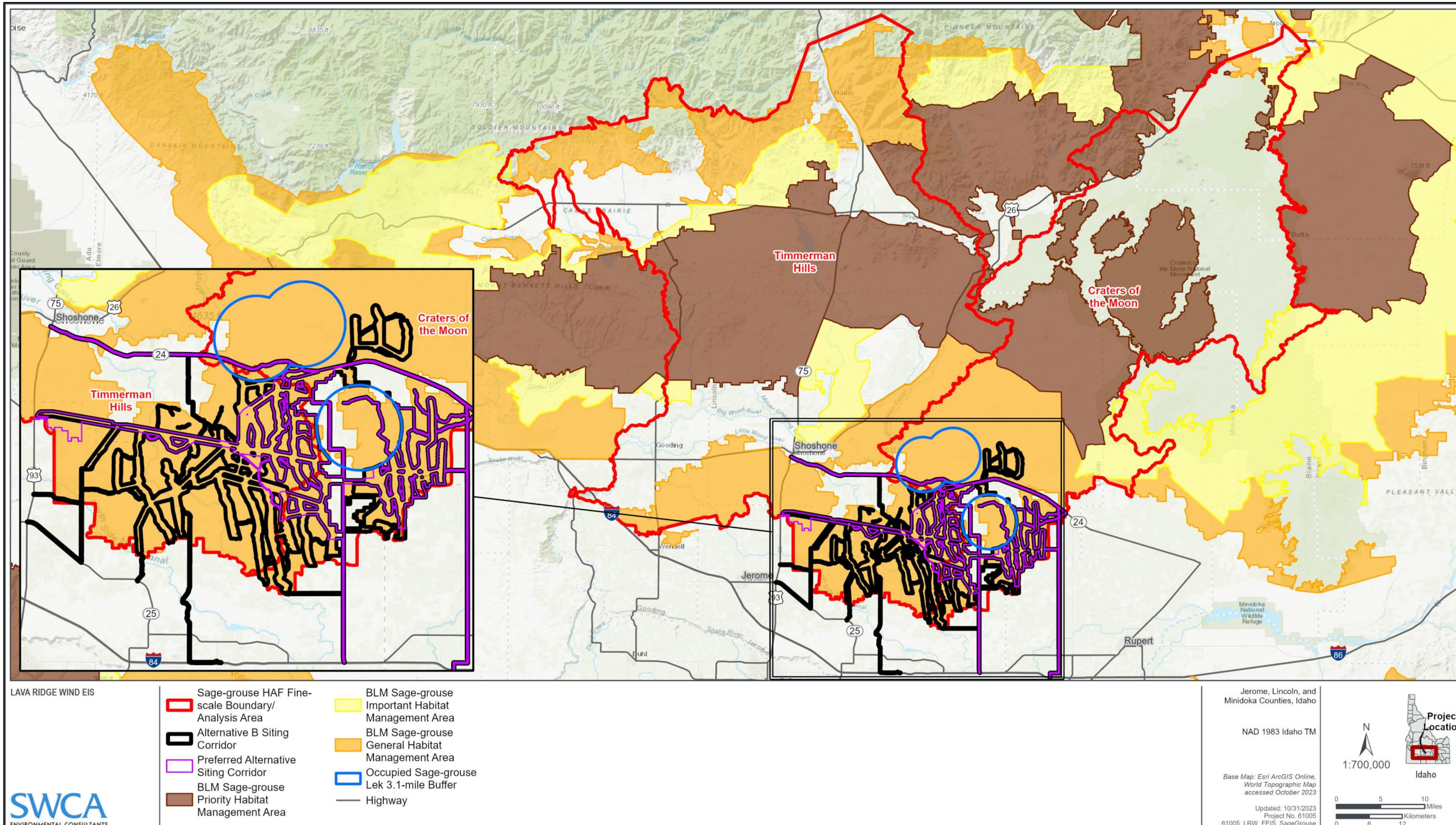

Figure 3.3-6. Greater sage-grouse analysis area.

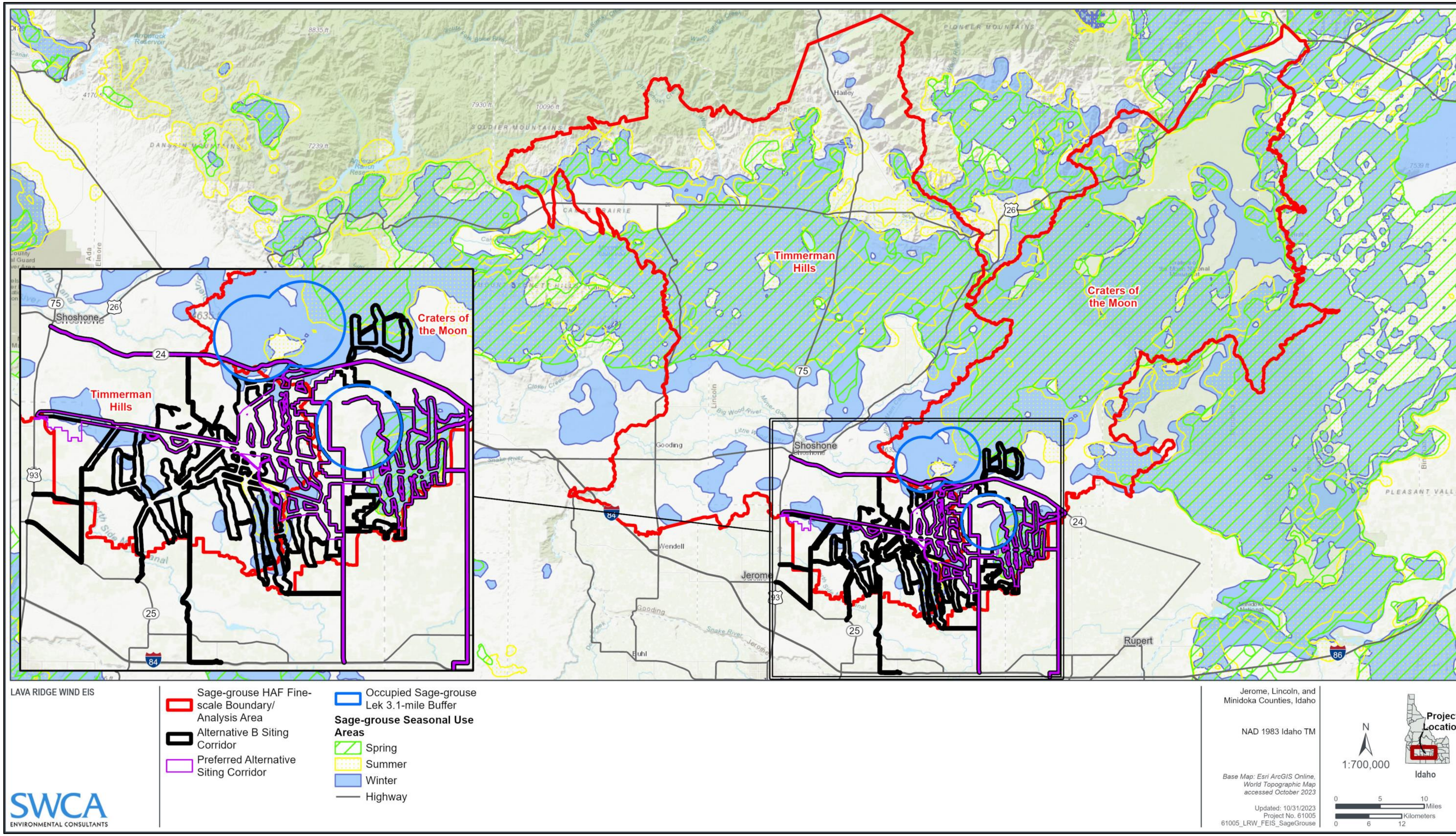

Figure 3.3-7. Greater sage-grouse seasonal use areas.

Table 3.3-19. Greater Sage-grouse Habitat Management Areas in the Analysis Area

Habitat Management Area	Description	Percentage of Analysis Area	Percentage of Siting Corridors
Priority	BLM public lands identified as having the highest habitat value for maintaining sustainable greater sage-grouse populations; largely coincide with the USFWS's Priority Areas for Conservation (USFWS 2013).	30%	0%
Important	BLM public land in Idaho that provides a management buffer for and that connect patches of Priority HMAs	7%	0%
General	BLM public land with greater sage-grouse habitat that is occupied seasonally or year-round and is outside of Priority HMAs; generally characterized by lower quality disturbed or patchy habitat of low lek connectivity (State of Idaho 2021a)	30%	91%
None	Not mapped as a sage-grouse HMA	33%	9%

Note: Management area descriptions from BLM (2015a).

Table 3.3-20. Mapped Greater Sage-grouse Seasonal Use Areas in the Analysis Area and Siting Corridors

HAF Fine-Scale Unit	Total Unit Acres	Spring SUA Acres (% of unit)	Summer SUA Acres (% of unit)	Winter SUA Acres (% of unit)
Timmerman Hills	1,277,840	411,285 (32%)	429,183 (34%)	562,655 (44%)
Craters of the Moon	861,774	435,295 (51%)	475,714 (55%)	582,466 (68%)
Total analysis area	**2,139,614**	**846,580 (40%)**	**904,897 (42%)**	**1,145,121 (54%)**
Alternative B siting corridors*	84,051	11,242 (13%)	15,553 (18%)	26,685 (32%)

* Acres for the siting corridors are accounted for in the HAF fine-scale units and do not contribute to the total. Additionally, SUAs overlap and thus do not sum to the total unit acres.

3.3.4.1 Affected Environment[11]

3.3.4.1.1 SAGE-GROUSE HABITAT

Sage-grouse are dependent on sagebrush habitats throughout the year, though they also exhibit some seasonal differences in habitat use (detailed below). Mature sagebrush habitat (> 10% cover) covers approximately 33% of the analysis area (Xian et al. 2015) (Figure 3.3-8) and another 22% of the analysis area is sagebrush with 5% to 10% cover. In the siting corridors, sagebrush habitat generally occurs in the north and east where it is interspersed with herbaceous communities (WEST 2020, 2021). The land surrounding the eastern, southern, and western portions of the siting corridors is mostly cultivated cropland. Across the distribution of sage-grouse, the loss and degradation of sagebrush habitat have extirpated sage-grouse from nearly half its original range (Schroeder et al. 2004), contributing to sage-grouse being a special-status species that was considered for protection under the ESA in 2010. The causes of habitat loss and degradation in the landscape relevant to the project include sagebrush habitat loss due to wildfire (BLM 2020, 2022); conversion of sagebrush to agriculture; invasion of nonnative, annual grasses; energy and housing development; and sagebrush control (USFWS 2013). The USFWS's "warranted, but precluded" finding regarding the potential ESA listing (USFWS 2010) prompted the publication of BLM (2015a), which provides a broad, landscape-level, national greater sage-grouse conservation strategy. According to BLM (2015a), approximately 91% of the siting corridors is located within the General HMA, and the remaining 9% of the siting corridors is not part of an HMA (see Figure 3.3-6 and Table 3.3-19).

[11] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

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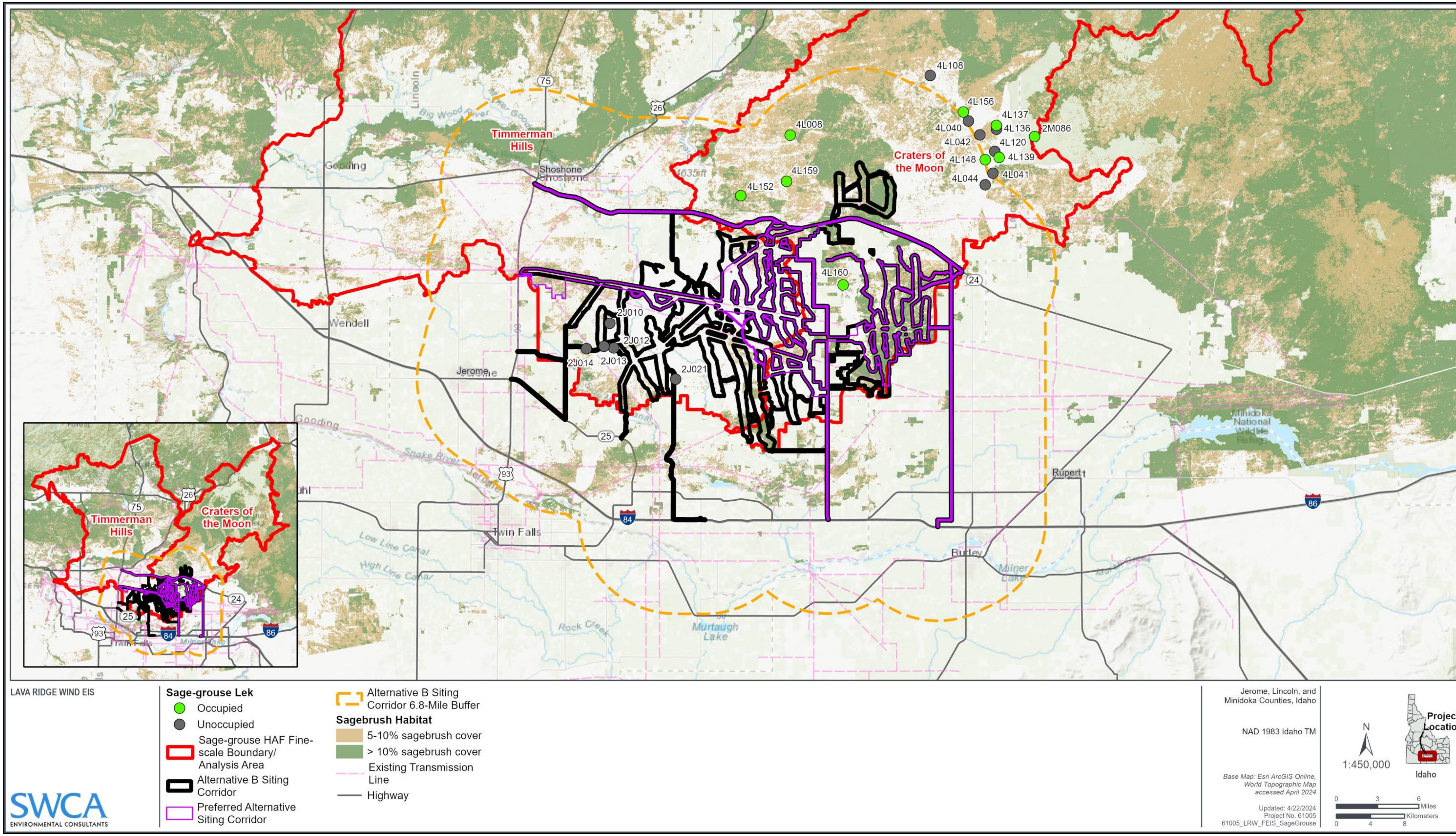

Figure 3.3-8. Greater sage-grouse leks and sagebrush habitat.

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The BLM HAF is used to define the fine-scale habitat units that make up the analysis area (described above) and is used to define greater sage-grouse habitat suitability for all seasonal habitat types at varying landscape scales (BLM 2015b). The HAF discusses four scales for assessing sage-grouse habitat suitability (Table 3.3-21). These scales provide a tiered approach to assessing impacts on the landscape and are important because habitat selection occurs at multiple spatial scales (Johnson 1980), and different resources may be selected at each scale. In addition, threats to sage-grouse and their habitat may be important at some scales and less so at others (Stiver et al. 2006). Habitat selection at multiple spatial scales must be considered for effective and efficient conservation and management (BLM 2015b; Johnson 1980).

Table 3.3-21. Greater Sage-grouse Habitat Assessment Framework Spatial Scales

HAF Scale	Description	Indicators of Habitat Quality
Broadscale	This scale is the range-wide distribution of sage-grouse populations throughout the West.	The range-wide potential pre-settlement habitat of both species of sage-grouse (greater sage-grouse and the Gunnison sage-grouse [*Centrocercus minimus*]) (1,200,483 km^2 [approximately 463,500 square miles]), which has declined 44% to a current distribution of approximately 668,412 km^2 (approximately 258,000 square miles). Habitat quality is assessed by the availability of large expanses of sagebrush or grass-sagebrush habitat, presence of migration corridors, and juxtaposition of other habitats and land uses within these large expanses.
Mid-scale	This scale accounts for how breeding populations move or disperse within a larger landscape to meet this species' seasonal habitat requirements. This is the scale where sage-grouse occupancy and dispersal are defined by the juxtaposition and extent of sagebrush habitat within a larger matrix of unsuitable habitat.	Landscapes have connected mosaic sagebrush shrublands that allow for bird dispersal and migration movements within the population or subpopulation area. Anthropogenic disturbances that can disrupt dispersal or cause mortality are generally not widespread or are absent.
Fine scale	This scale accounts for an individual's home range and seasonal habitats within the home range (e.g., brood-rearing habitat within a home range).	Home ranges have connected SUAs. Anthropogenic features that disrupt seasonal movements or cause mortality are generally absent or at least not widespread.
Site scale	This scale accounts for vegetation structure and composition characteristics within specific seasonal habitats, which provide for daily needs, including forage and cover needed for breeding, brood-rearing, and winter survival.	Sagebrush cover and height, perennial grass cover and diversity, forb abundance and diversity, juniper canopy cover, invasive annual grasses.

Sources: BLM (2015b); Connelly et al. (2004); State of Idaho (2021a).

Three seasonal habitats are essential to maintaining greater sage-grouse populations: spring habitat that includes breeding, nesting, and early brood-rearing habitats; summer habitat that includes late brood-rearing habitat; and wintering habitats (see Figure 3.3-7 for locations of these habitats in the analysis area).

The BLM assessed habitat quality for the Desert mid-scale and Timmerman Hills and Craters of the Moon HAF (fine-scale) units, which are part of the Snake, Salmon, and Beaverhead greater sage-grouse population identified by the USFWS in 2015 (BLM 2018a, 2020). These reports include summarizations of mid-scale (landscape scale or population-level scale) and fine-scale habitat (home range scale). The suitable habitat identified in these reports was delineated by IDFG using telemetry locations and environmental variables. The Desert mid-scale habitat was assessed as marginal; only 63% of the occupied habitat (sagebrush habitat known to be used by greater sage-grouse within the last 10 years; Stiver et al. 2015) assessed was suitable, and the population was isolated. The assessment concluded that the area has the potential to support 50% more sagebrush than currently exists on the ground. The occupied habitat patches were large, but only 26% of the patches were occupied, and there were large distances between them; the linkage areas connecting seasonal habitats were 75% marginal or unsuitable. Patch connectivity was marginal: the mean distance between patches (roughly 50 feet) was twice that found in the two adjacent mid-scale areas. The Desert mid-scale was ranked suitable regarding anthropogenic disturbance because within habitat patches, disturbance is low (BLM 2020).

The Craters of the Moon fine-scale habitat and seasonal habitat availability was rated as marginal with 55% characterized as occupied and suitable (BLM 2020). Wildfire has altered the landscape and removed large portions of mature sagebrush cover (BLM 2020, 2022) and has limited the amount of seasonal habitat and connectivity in this area. Anthropogenic disturbance was present but limited and most common in the southern portion of the HAF unit. This disturbance was considered to be at a very low level at the time of this report. Connectivity between SUAs was marginal. Site-scale habitat suitability for SUAs is summarized in Table 3.3-22. Areas in this fine-scale unit that were assessed as unsuitable habitat were unsuitable due to a lack of sagebrush (BLM 2020).

Table 3.3-22. Greater Sage-grouse Site-Scale Habitat Suitability in the Analysis Area

HAF Fine-Scale Unit	General Rating and Occupancy	Occupied Habitat % Suitable Spring SUA	Occupied Habitat % Suitable Summer SUA	Occupied Habitat % Suitable Winter SUA
Timmerman Hills	Marginal 38% occupied	90%	87%	80%
Craters of the Moon	Marginal 55% occupied	66%	59%	55%

Source: BLM (2020).

The Timmerman Hills fine-scale habitat was rated as marginal and composed of 37% SUAs and 63% not containing SUAs. However, habitat availability within the SUAs was high at 90%, 87%, and 80% in spring, summer, and winter SUAs, respectively. Connectivity between SUAs was suitable (providing resources for multiple life stages over most of the fine-scale area) with much overlap between SUAs. Anthropogenic disturbance was rated as marginal with low density of point features (< 0.00006 sites/square mile) within SUAs. However, linear features were relatively dense at 0.47 mile per square mile, especially in unoccupied habitats. Site-scale habitat suitability for SUAs is summarized in Table 3.3-22. Areas in this fine-scale unit were assessed as unsuitable habitat mainly due to insufficient sagebrush cover and height (BLM 2020). In summary, even though less than half of the Timmerman Hills HAF unit is designated as sage-grouse SUAs, the SUAs that are in this HAF unit are highly suitable and important for sage-grouse. However, all of the spring and summer SUAs and most of the winter SUAs are north of the project area (BLM 2018a).

3.3.4.1.2 SAGE-GROUSE POPULATION AND DISTRIBUTION

Based on a desktop habitat assessment (WEST 2020) and preliminary consultation with IDFG, WEST identified areas for aerial and ground lek surveys within 6 miles of the siting corridors to check known occupied lek locations and to identify new lek locations (WEST 2021). BLM (2015a) defines *occupied* leks as leks that have been active during at least one breeding season within the prior 5 years, and *unoccupied* leks as those that have not been active for 5 consecutive years. WEST surveyed areas that were identified as suitable habitat in their desktop habitat analysis in collaboration with IDFG; not all areas affected by the siting corridors were surveyed because some were identified as unsuitable habitat. No new lek locations were identified during aerial surveys in these areas. Three known occupied leks within 6 miles of the siting corridors (4L152, 4L159, and 4L160) were checked in March and April 2020 and 2021, and displaying males were confirmed at leks 4L152 and 4L159 in 2020 (WEST 2020). No males were reported near lek 4L160 in 2020 during WEST surveys, even though they were reported near this lek in 2019 (though it was noted that there were sheep grazing near this lek in 2020 that might have affected activity during surveys). However, the BLM did report actively displaying males on this lek in late March 2020 (WEST 2020). Actively displaying males were confirmed at leks 4L152, 4L159, and 4L160 during each round of surveys in 2021 (WEST 2021). IDFG recorded actively displaying males at these leks in 2022, and at lek 4L159 in 2023 (IDFG 2023a). The presence of suitable habitat indicates that sage-grouse use is likely limited to the eastern and northern portions of the siting corridors (see Figure 3.3-8; Table 3.3-22). The areas identified as sagebrush habitat and the known lek locations were important factors used to help guide project siting and minimization measures (see Section 2.3.4 [Avoidance and Minimization] and EIS Appendix 4). However, areas within 6 miles of the siting corridors that were identified as unsuitable were not surveyed by WEST. Before project construction, MVE's designated biologist would consult with IDFG for technical assistance and would conduct lek surveys on previously unsurveyed areas identified by MVE as unsuitable habitat (WEST 2021) within 3.1 miles of the siting corridors. These areas would be surveyed by the designated biologist to search for leks that have not yet been identified (see Table App4-4). Required design features (RDFs) (see Table App4-3) and additional compensatory mitigation would be required if new occupied leks are found, in accordance with BLM (2015a).

Attachment 1 in BLM (2023) states the following:

> . . . the determination of which leks are occupied and should be carried forward in NEPA analysis, will be made using the raw count data in light of the 2015 ARMPA definitions, rather than rely on categories designated by IDFG . . . The BLM Idaho State Office will evaluate each Case-by-Case lek with the supporting ecological/environmental information in the BLM Interim Rule Set . . . and determine an *initial* lek status. The *final* status of the Case-by-Case leks will be determined in consultation and coordination between the BLM Idaho State Office and relevant Field Office wildlife biologists. (BLM 2023:Attachment 1, page 2)

In coordination with IDFG, seven of the eight previously *undetermined* leks[12] identified in the draft EIS are now unoccupied and therefore do not warrant further consideration for BLM management. This conclusion is supported by additional lek count data from 2022 and 2023 and the following data: It has been approximately 70 years since sage-grouse were observed displaying in leks 2J010, 2J011, 2J012, 2J013, 2J014, 2J017, and 2J021. These same leks have had three to six repeated counts of zero since 2000; leks 2J012, 2J013, 2J014 also had a count of zero in 1972. In addition, these seven leks occur in a fragmented landscape with little remaining sagebrush cover. In all, 12% to 45% of the area within a 3.1-mile radius of these leks has sagebrush cover greater than 5% (Rigge et al. 2023). Landscape-scale sagebrush cover, proportion of agriculture, and proportion of habitat dominated by annual grass (which affects fire frequency in sage-grouse habitat) are important for lek persistence. Occupied leks typically have more than 40% sagebrush cover within a 3.1-mile radius (Knick et al. 2013). The area around these seven leks is also dominated by high annual grass cover within a 3.1-mile radius around the leks, with 24% to 71% of the area having 20% or more annual grass cover. The area within a 3.1-mile radius around leks 2J011, 2J013, 2J014, 2J017, and 2J021 includes 14% to 45% agriculture, which is outside of the normal average for sage-grouse leks across their historic range, as presented in Knick et al. (2013). The area within a 3.1-mile radius around leks 2J010 and 2J012 includes 9% agriculture for each, which is within the normal average. The area within a 3.1-mile radius around leks 2J011, 2J014, 2J017, and 2J021 includes 3% to 5% of developed land, which is also outside of the normal average for sage-grouse leks across their historic range as presented in Knick et al. (2013). The area within a 3.1-mile radius around leks 2J010, 2J012, and 2J013 is within the normal average of 0% to 2%. Since these seven leks have

[12] Undetermined leks are defined by the IDFG as leks that have not been surveyed or documented as active in the last 5 years, or have insufficient survey information to be designated as unoccupied (IDFG 2023b).

limited sagebrush across the landscape, have high annual grass cover, and are within a landscape further fragmented by agriculture and other land uses, and the leks have had numerous counts of zero over the past 20 plus years, the BLM's independent determination of these seven leks is that they are unoccupied. This is also supported by IDFG definitions of five of these leks as historical, i.e., no lekking activity in the last 20 years, and two leks (2J011, 2J017) do not meet IDFG's definition of a lek, i.e., the lek never had two counts of two or more males within a 10-year period. In summary, none of the previously undetermined leks are active/occupied and thus are not managed under BLM (2015a).

One of the eight previously undetermined leks identified in the draft EIS (4L008) had four counts of zero between 2014 and 2022, and it has been over 40 years since it was occupied. However, lek 4L008 is within 3 and 5 miles of two occupied leks, 4L159 and 4L152, respectively, both with up to 20 birds, and the kernel density, similar to breeding bird density, is medium to high in this area, partly due to several occupied leks to the north and northeast. Kernel density is derived from 1) breeding bird density calculated from the 5-year maximum male count within 10 km of leks with two or more males from 2018 to 2022, and 2) summarizing overlapping 5-year maximum male count values from breeding bird density within 5 km of the aforementioned leks. Habitat characteristics around lek 4L008 are similar to those around leks 4L152 and 4L159. All three of these leks have low landscape sagebrush cover (< 15%) and high annual grass cover (> 40%) due to fires but are within 2 to 3 miles of larger contiguous patches of sagebrush cover. Furthermore, there are telemetry locations around leks 4L152 and 4L159 and to the north of 4L008. Due to the counts and recent change in lek definitions, IDFG no longer considers 4L008 a lek. However, the BLM's independent determination is to consider lek 4L008 as occupied. Because of the proximity and similar characteristics of occupied leks 4L152 and 4L159, kernel density or breeding bird density, and telemetry locations in the area, there is insufficient information for the BLM to consider lek 4L008 as unoccupied under BLM (2015a). Therefore, the BLM would err on the side of caution for sage-grouse conservation and treat lek 4L008 as occupied.

3.3.4.1.3 SAGE-GROUSE MANAGEMENT REQUIREMENTS

Sage-grouse habitat is managed under BLM (2015a), which established RDFs for certain activities in all sage-grouse habitats. One of the requirements is to avoid certain actions within a specified distance of occupied leks (Table 3.3-23). These buffers apply to occupied leks only (they do not apply to leks with other types of status) (BLM 2015a). Applicable RDFs are listed in Table App4-3 in EIS Appendix 4 and considered as required mitigation measures in this EIS. See Table 3.3-24 for a summary of occupied lek distances from siting corridors within a 6.8-mile buffer of siting corridors.

Table 3.3-23. Greater Sage-grouse Buffer Requirements

Activity	Required Buffer to Occupied Lek (miles)
Linear features (roads), infrastructure related to energy development, surface disturbance	3.10
Tall structures (e.g., communication or transmission structures, transmission lines)	2.00
Low structures (e.g., fences, rangeland structures)	1.20
Noise and related disruptive activities including those that do not result in habitat loss (e.g., motorized recreational events)	0.25

Source: BLM (2015a).

Table 3.3-24. Greater Sage-grouse Leks within 6.8 miles of Alternative B Siting Corridors

Lek ID	Lek Status 2023	Distance to Siting Corridor
4L160	Occupied	1.4 miles 3.1 miles to closest turbine and transmission line 1.7 miles to closest fence 1.5 miles to closest improved existing road 3.1 miles to closest new road
4L152	Occupied	2 miles 3.1–3.5* miles to closest turbine or transmission line 3.1 miles to closest fence 2.0 miles to closest improved existing road 3.1 miles to closest new road
4L159	Occupied	2.9 miles 4.2 miles to closest turbine 3.8 miles to transmission line 3.0 miles to closest fence 2.9 miles to closest improved existing road 3.1 miles to closest new road
4L008	Occupied‡	4.4 mile 7.4–7.5* miles to closest turbine 7.0–7.5* miles to transmission line 4.6 miles to closest fence 4.6 miles to closest improved existing road 6.5 miles to closest new road
4L044	Unoccupied†	6 miles
2J010	Unoccupied†	0.4 mile
2J012	Unoccupied†	0 mile
2J013	Unoccupied†	0 mile
2J014	Unoccupied†	0 mile
2J021	Unoccupied†	0.1 mile

Source: IDFG (2023a)

Notes: 6.8 miles is the distance within which noise may be elevated, as described in Section 3.3.4.2 (Impacts), Issue 2.

Occupied (BLM 2015a): A lek that has been active during at least 1 breeding season within the prior 5 years.
Unoccupied (BLM 2015a): A lek that has not been active for five consecutive years. To be designated unoccupied, a lek must be inactive for five consecutive breeding seasons.

Buffers (and thus distances) for fences and infrastructure apply to occupied leks only.

Improved existing road: Refers to ID 24 and existing county roads that are not under the BLM's jurisdiction.

* Range of distances varies by alternative.

† 3 to 6 repeated counts of 0 sage-grouse observed on leks since 2000, including a 0 count in 2018; last birds detected in early to mid-1950s.

3.3.4.1.4 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence greater sage-grouse populations in the analysis area through introduction and spread of invasive annual grasses, grazing, wildfire, vegetation treatments, seeding, conversion of lands to agriculture or rural residential, and development of energy infrastructure, particularly where those actions occur in suitable sage-grouse habitat (sagebrush). These existing and future trends and actions have affected or would affect 1,341,813 acres (63%) of the 2,139,614-acre analysis area. Impacts of wildfire and invasive species will likely be exacerbated by climate change, which is expected to favor expansion of cheatgrass and increase wildfire disturbance (Miller et al. 2011). Homer et al. (2015) predict a loss of 11.6% of currently identified sage-grouse nesting habitat and a loss of 4% of summer sage-grouse habitat using two precipitation scenarios from the Intergovernmental Panel on Climate Change (IPCC) (2007). Rigge et al. (2021) modeled landscape effects based on future weather conditions from two emission scenarios)[13], though they do not consider the impacts of disturbance, interannual weather variability in the future, or changes to management practices. Rigge et al. (2021) modeled landscape effects at the scale of the sagebrush biome in the western United States (but not at smaller spatial scales) to predict how habitat might change in Idaho. Their results predict more xeric vegetation across the sagebrush biome of the western United States, with an increasing dominance of non-sagebrush shrubs, annual herbaceous cover, and bare ground over herbaceous and sagebrush cover. Both representative concentration pathway (RCP) scenarios[14] result in a reduction in sagebrush cover across much of its range, but an increase in sagebrush cover was projected in Wyoming, eastern Montana, and the northern Great Basin. At RCP 8.5, a decrease of 2.4% (a proportional reduction of approximately 35%) in sagebrush cover across its range was projected by 2080. Eastern Idaho is expected to experience a reduction in sagebrush cover and an increase in bare ground, and it is one of the places projected to experience the largest increase in annual herbaceous cover (Rigge et al. 2021).

The trend of increased renewable energy development in the analysis area (see Section 3.1.1 [Existing and Future Trends and Actions]) is expected to continue. Three solar energy facilities and another wind energy facility are proposed in the analysis area adjacent to the Lava Ridge Wind Project. The Taurus Wind Project, located immediately northwest of the Lava Ridge Wind Project, would be similar in size and scale to the Lava Ridge Wind Project. The Invenergy Gem Vale solar facility would be just north of the Midpoint Substation on approximately 3,500 acres. Two Longroad Energy solar facilities would cover 3,500 and 3,700 acres, respectively, just east of U.S. 93 and south of (connecting to) the Midpoint Substation. All the solar facilities would have fencing surrounding the facilities. The one wind and three solar projects would be located in the Timmerman Hills fine-scale General HMA (Figure 3.3-6) and may affect winter SUAs for sage-grouse (Figure 3.3-7). The 800-MW Salmon Falls Wind Project is proposed on federal lands 30 miles south of the Lava Ridge Wind project and would occur outside of the greater sage-grouse analysis area.

3.3.4.2 Impacts

3.3.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and greater sage-grouse would only be affected by existing and future trends and actions.

3.3.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

Issue 1. How would the project affect sage-grouse habitat?

Potential direct and indirect impacts to greater sage-grouse leks and habitat may occur from the presence of project infrastructure (turbines, roads, transmission lines, guy wires, etc.) and the increase in human activity at all spatial scales (described above in Affected Environment, Sage-grouse Habitat), particularly during construction and decommissioning (Table 3.3-25). Though NEPA defines indirect effects as those that occur later in time or farther removed in distance (40 CFR 1508.8(b)), this EIS also analyzes indirect effects as described and accounted for in the HQT analysis, i.e., effects that reduce the integrity or function of the surrounding habitat, even if the surrounding habitat has suitable habitat for greater sage-

[13] The emission scenarios used for climate modeling by Rigge et al. (2021) used two representative concentration pathways (RCPs): 4.5 and 8.5.
[14] Ibid.

grouse (State of Idaho 2021a). In the HQT, indirect effects are based primarily on distance to anthropogenic disturbances, thus considers both anthropogenic features as well as human activity associated with those features. Per the HQT analysis, this EIS also describes effects to functional acres, which is the quality and amount of habitat available for meeting life history requirements (reproduction, recruitment, and survival) for sage-grouse at multiple scales (State of Idaho 2021a). Effects to functional acres incorporate both direct and indirect effects to habitat. The HQT weights permanent disturbance more heavily than temporary disturbance, so permanent disturbance (i.e., infrastructure areas) would have a larger effect on functional acres than temporary disturbance (i.e., work areas).[15] However, work areas may be re-disturbed during operation and would receive interim reclamation (immediately following ground disturbance) before final decommissioning. For example, work areas may be re-disturbed to replace turbine blades and then would receive interim reclamation; all areas disturbed by the project would be reclaimed after final decommissioning.

The HQT incorporates metrics that influence greater sage-grouse distribution and habitat selection (vegetation, fragmentation, landscape context, and anthropogenic disturbance) across multiple spatial scales (range-wide, landscape [i.e., mid-scale], local [i.e., fine-scale], and site scales) to quantify functional seasonal habitat (State of Idaho 2021a). Greater sage-grouse spatial data used in the HQT included breeding densities and seasonal habitat suitability indices.

The project would minimize (though not avoid) effects on spring habitat by locating infrastructure 3.1 or more miles from leks (as required by BLM [2015a]). Based on studies outlined in Issues 1, 2, and 3 (see Smith et al. [2016] for effects of conversion of sagebrush to croplands on sage-grouse and Johnson et al. [2012] for effects of wind energy development on sage-grouse), sage-grouse activity at leks closest to the siting corridors (leks 4L160, 4L152, and 4L159) may decline, or the leks may be lost even with the 3.1-mile avoidance buffer around leks. This scenario is most probable for lek 4L160 because it would be almost surrounded by infrastructure.

Some winter and summer habitat SUAs would be altered and fragmented (indirect effect as accounted for in the HQT and expressed as functional habitat loss) and may result in avoidance of these SUAs as described in Connelly et al. (2011), Kohl et al. (2019), LeBeau et al. (2017), and other studies described and cited in Issues 1, 2 and 3. Modifications to SUAs would result in 786 acres of permanent functional habitat loss and 21 acres of temporary functional habitat loss as calculated by HQT. This loss would require compensatory mitigation as per BLM (2015a) and is described in Section 3.3.4.4 (Compensatory Mitigation). The acres of ground disturbance and acres of functional habitat loss are summarized in Table 3.3-25. Acres of SUAs impacted describe the amount of ground disturbance within modeled sage-grouse seasonal habitat. The SUA habitat model was developed by the IDFG and is based on sage-grouse habitat selection patterns for certain vegetation and environmental variables as determined by telemetry locations. The SUA model does not reflect telemetry locations alone, but rather reflects a broader set of telemetry and modeled habitat variables. Acres of sagebrush shrubland impacted and HMA categories describe impacts at the mid- and fine scales.

Indirect habitat fragmentation would occur for the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) until native vegetation has re-established (for a total of approximately 84–86 years) and is analyzed in more detail in Issue 3. Indirect habitat loss (expressed as the loss of functional habitat) was calculated using the Idaho HQT (State of Idaho 2021a). These calculations consider habitat suitability, leks and breeding bird density, late brood-rearing habitat, HMA designations, extent of NLCD shrubland cover, existing anthropogenic disturbance, and the additional disturbance that would be created by the project.

[15] Work areas and infrastructure areas are defined in Section 2.3.2 (Work Area and Infrastructure Disturbance).

Table 3.3-25. Summary of Impacts to Greater Sage-grouse

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Distance of project to sage-grouse habitat	0 mile to work areas 0 mile to infrastructure areas	0 mile to work areas 0 mile to infrastructure areas	1.9 miles to work areas 1.9 miles to infrastructure areas	0 mile to work areas 0 mile to infrastructure areas	0 mile to work areas 0 mile to infrastructure areas
Acres of ground disturbance in spring SUAs	898 acres work areas 316 acres infrastructure areas	806 acres work areas 283 acres infrastructure areas	0 acre work areas 0 acre infrastructure areas	755 acres work areas 283 acres infrastructure areas	781 acres work areas 222 acres infrastructure areas
Acres of ground disturbance in summer SUAs	1,243 acres work areas 437 acres infrastructure areas	1,123 acres work areas 395 acres infrastructure areas	384 acres work areas 116 acres infrastructure areas	706 acres work areas 265 acres infrastructure areas	773 acres work areas 219 acres infrastructure areas
Acres of ground disturbance in winter SUAs	2,132 acres work areas 750 acres infrastructure areas	1,667 acres work areas 586 acres infrastructure areas	801 acres work areas 243 acres infrastructure areas	1,167 acres work areas 438 acres infrastructure areas	1,264 acres work areas 359 acres infrastructure areas
Acres of ground disturbance in sagebrush habitat with > 10% cover[†]	940 acres work areas 331 acres infrastructure areas	724 acres work areas 255 acres infrastructure areas	298 acres work areas 90 acres infrastructure areas	625 acres work areas 235 acres infrastructure areas	539 acres work areas 153 acres infrastructure areas
Acres of ground disturbance in General HMAs	6,145 acres work areas 2,161 acres infrastructure areas	4,611 acres work areas 1,621 acres infrastructure areas	3,386 acres work areas 1,026 acres infrastructure areas	3,306 acres work areas 1,240 acres infrastructure areas	5,024 acres work areas 1,426 acres infrastructure areas
Acres of permanent functional habitat loss* from HQT analysis	786.2 acres	535.9 acres	74.1 acres	542.4 acres	524.4 acres
Acres of temporary functional habitat loss* from HQT analysis	21.3 acres	18.1 acres	1.3 acre	17.8 acres	17.5 acres
Miles of new temporary fence in the analysis area	395 miles	303 miles	222 miles	257 miles	200 miles
Number of new troughs	65	55	40	38	40

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Number of turbines, miles of new roads, miles of new transmission lines in spring SUAs††	95 turbines 75 miles roads 33 miles 34.5-kV collector lines^ 3 miles 230-kV transmission lines 0 mile 500-kV transmission lines	86 turbines 66 miles roads 9 miles 34.5-kV collector lines^ 17 miles 230-kV transmission lines 0 mile 500-kV transmission lines	0 turbine 0 mile roads 0 mile 34.5-kV collector lines^ 0 mile 230-kV transmission lines 0 mile 500-kV transmission lines	86 turbines 66 miles roads 26 miles 34.5-kV collector lines^ 3 miles 230-kV transmission lines 0 mile 500-kV transmission lines	86 turbines 66 miles roads 32 miles 34.5-kV collector lines^ 3 miles 230-kV transmission lines 0 mile 500-kV transmission lines
Number of turbines, miles of new roads, miles of new transmission lines in summer SUAs††	144 turbines 109 miles roads 51 miles 34.5-kV collector lines^ 4 miles 230-kV transmission lines 0 mile 500-kV transmission lines	131 turbines 98 miles roads 7 miles 34.5-kV collector lines^ 13 miles 230-kV transmission lines 0 mile 500-kV transmission lines	47 turbines 35 miles roads 14 miles 34.5-kV collector lines^ 1 miles 230-kV transmission lines 0 mile 500-kV transmission lines	84 turbines 64 miles roads 26 miles 34.5-kV collector lines^ 3 miles 230-kV transmission lines 0 mile 500-kV transmission lines	93 turbines 67 miles roads 34 miles 34.5-kV collector lines^ 3 miles 230-kV transmission lines 0 mile 500-kV transmission lines
Number of turbines, miles of new roads, miles of new transmission lines in winter SUAs††	200 turbines 163 miles roads 67 miles 34.5-kV collector lines^ 4 miles 230-kV transmission lines 4 miles 500-kV transmission lines	161 turbines 123 miles roads 16 miles 34.5-kV collector lines^ 31 miles 230-kV transmission lines 5 miles 500-kV transmission lines	74 turbines 58 miles roads 23 miles 34.5-kV collector lines^ 1 miles 230-kV transmission lines 5 miles 500-kV transmission lines	107 turbines 87 miles roads 35 miles 34.5-kV collector lines^ 4 miles 230-kV transmission lines 5 miles 500-kV transmission lines	114 turbines 92 miles roads 44 miles 34.5-kV collector lines^ 4 miles 230-kV transmission lines 0 mile 500-kV transmission lines
Number of turbines, miles of new roads, miles of new transmission lines in General HMAs	397 turbines 459.8 miles roads 245.6 miles 34.5-kV collector lines^ 25.9 miles 230-kV transmission lines 15.04 miles 500-kV transmission lines	376 turbines 337.9 miles roads 173.2 miles 34.5-kV collector lines^ 25.9 miles 230-kV transmission lines 16.41 mile 500-kV transmission lines	279 turbines 258.2 miles roads 130.7 miles 34.5-kV collector lines^ 21.6 miles 230-kV transmission lines 16.41 miles 500-kV transmission lines	267 turbines 251.5 miles roads 127.7 miles 34.5-kV collector lines^ 17.9 miles 230-kV transmission lines 16.41 miles 500-kV transmission lines	239 turbines 231.4 miles roads 109.7 miles 34.5-kV collector lines^ 17.3 miles 230-kV transmission lines 16.41 miles 500-kV transmission lines

Note: Distance of project to leks provided in Table 3.3-24.

* Area within 3.7 miles of turbines and 3.1 miles of transmission lines or met towers as per the HQT. Permanent describes direct and indirect functional habitat loss and temporary describes only direct functional habitat loss.

^ Total miles of collector lines includes both overhead and underground; exact location of overhead collector lines undetermined.

† Data from Xian et al. (2015).

†† SUAs overlap and thus do not sum to the total amount of infrastructure proposed for the project.

The removal and conversion of vegetation during construction and operation would decrease the availability and quality of sage-grouse habitat in the analysis area. Areas of sagebrush removed for installation of infrastructure would be converted to uses that provide no suitable habitat for sage-grouse. Additionally, increased noise, fugitive dust, and vectors for introduction or spread of weeds and invasive species could degrade sage-grouse habitat. (See Vegetation AIB-41 and Wildlife AIB-57 and AIB-59 in EIS Appendix 3 for a description of effects to habitat from weeds and invasive plant species.) As sagebrush habitat is altered or removed due to anthropogenic uses, the number of occupied leks rapidly decreases (Smith et al. 2016). For example, approximately 10% increase in conversion of sagebrush habitat to cropland can reduce the density of occupied leks (measured as occupied lek sightings per unit area) by over half at a scale of 32.2 km^2 (Smith et al. 2016). This study did not assess other mechanisms that may influence populations, such as adult female survival, nest success, or brood survival/chick survival. However, occupied leks (4L160, 4L159, and 4L152) in the southern portion of the analysis area, particularly within 3.1 miles of siting corridors, could be less active (i.e., have lower male or female attendance) due to the removal of areas of sagebrush and installation of infrastructure in the analysis area.

In their study of the effects of electric power transmission and distribution lines on sage-grouse in portions of Utah, southeastern Idaho, and southwestern Wyoming, Kohl et al. (2019) documented that powerlines decrease abundance at sage-grouse leks up to 1.7 miles but do not appear to affect lek persistence. No turbines, transmission lines, or new roads would be located within 3.1 miles of any occupied sage-grouse leks. Based on the summary of research on the effects of anthropogenic disturbance on sage-grouse provided throughout this issue as well as Issues 2 and 3, sage-grouse could avoid leks or other SUAs near the project with the start of construction and not return during operation, maintenance, and decommissioning (at least 84 years). Leks 4L160, 4L152, and 4L159 are the most likely to be affected, with the highest potential for an impact at lek 4L160. Avoidance could result in a reduction of activity or even loss of leks, which could reduce the density of occupied leks in the analysis area. Spring, summer, and winter SUAs would be disturbed, with the most ground disturbance occurring in winter SUAs (see Table 3.3-25). The project may render some SUAs unsuitable for sage-grouse because sage-grouse may reduce activity in or avoid SUAs closer to siting corridors, as suggested in Connelly et al. (2011), Kohl et al. (2019), LeBeau et al. (2017), and other studies described in more detail elsewhere in Issues 1, 2 and 3. These effects are taken into account by the HQT analysis as acres of functional habitat that would be lost and require mitigation (State of Idaho 2021a). There may be a lag in the response of sage-grouse to the project; reduction in activity and avoidance may not be fully realized until 3 or more years after construction begins (LeBeau et al. 2017). Required mitigation measures B and C would limit anthropogenic disturbance in nesting season in spring SUAs and in winter in winter SUAs but would not eliminate impacts. MVE would restore disturbed areas after decommissioning to the pre-disturbance landforms and desired plant community (required mitigation measure P). These measures could minimize but not avoid the potential effects described above. These measures could restore functionality to SUAs, but not for at least 84 years when the project is decommissioned.

An increased probability of population persistence is associated with increased availability of sagebrush on the landscape (Aldridge and Boyce 2007). Approximately 940 acres of lands with greater than 10% sagebrush cover would be altered by project work areas (0.1% of the sagebrush habitat in the analysis area) and 331 acres would be removed by infrastructure (< 0.1% of the sagebrush habitat in the analysis area) (see Table 3.3-25). The project would also fragment sage-grouse habitat by adding turbines, new roads, fences, overhead 34.5-kV collector lines, 230-kV transmission lines, and 500-kV transmission lines in sage-grouse habitat (General HMAs). Connectivity would likely be reduced between lek 4L160 and leks 4L152 and 4L159 to the northwest. Connectivity is likely already reduced due to ID 24 running between lek 4L160 and leks 4L152 and 4L159, but the project would further reduce connectivity. The number of these project components that would occur in the different SUAs is detailed in Table 3.3-25.

As per BLM (2015a), a number of mitigation measures would be required for all action alternatives to reduce the potential effects to sage-grouse. MVE would bury powerlines where feasible within existing disturbance (required mitigation measure D) to avoid areas of new disturbance. In addition, the project would co-locate linear features within 1 mile of existing facilities (required mitigation measure F) and place infrastructure in locations where habitat has not been fully restored (required mitigation measure E) to minimize new habitat disturbance. The BLM would require sage-grouse-safe fences and restrict the construction of tall facilities and fences to the minimum number and amount needed (required mitigation measure L). Temporary fencing (e.g., ESR, drop-down fencing) would be used where feasible (required mitigation measure S), and new wire fences would be avoided within 1.2 miles (2 km) of occupied leks (required mitigation measure R). If this is not feasible, MVE would ensure that high-risk segments are marked with collision-diverter devices or as latest science indicates. The closest project fence to an occupied lek would be 2 miles. These measures would minimize the habitat fragmentation effects that powerlines and fences can have on sage-grouse and reduce potential mortality from collisions with those structures.

MVE's applicant-committed measure to minimize work areas and infrastructure areas (measure 1) would minimize potential degradation of sagebrush habitat. Applicant-committed measures to reduce noise (measures 89 and 95), avoid or minimize fugitive dust (measures 113 to 119), and prevent the introduction or spread of noxious weeds and invasive species (measures 100 to 112) would also minimize the potential for the project to degrade sage-grouse habitat.

Alternative B would add 65 water troughs as range improvements to account for potential impacts to grazing operations in the Star Lake, Sid Butte, North Milner, Wildhorse, and Camp I allotments, as described in Appendix S of MVE (2023). Since troughs can attract mosquitos that could carry West Nile virus, which can cause declines in sage-grouse populations (BLM 2015a), required mitigation measures would be implemented to avoid and minimize that potential. MVE would install ramps in new and existing livestock troughs and open water storage tanks to facilitate the use of and escape from troughs by greater sage-grouse and other wildlife (required mitigation measure T). Water return features would be constructed and functioning float valves maintained to prohibit water from being spilled on the ground surrounding the trough and/or tank and return water to the original water source, to the extent practicable (required mitigation measure U). MVE would install and maintain float valves on stock tank fill pipes to minimize overflow (required mitigation measure V) and harden stock tank pads to reduce tracks that could hold water where mosquitoes may breed (required mitigation measure W).

Even with MVE's applicant-committed measures and the required mitigation measures described above (and detailed in EIS Appendix 4), residual effects to sage-grouse could occur due to loss of functional habitat (as calculated by the HQT; see Table 3.3-25). There may be additional impacts if unscheduled or emergency maintenance is required during the life of the project. Impacts from these activities would be similar to those expected during project construction. Therefore, compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Issue 2. How would project noise and human activity affect sage-grouse?

Noise and human activity can disturb or displace sage-grouse. MVE would avoid repeated or sustained behavioral disturbance (visual disturbances, noise that is 10 dBA greater than baseline levels at lek, etc.) of lekking birds from 6:00 p.m. to 9:00 a.m. within 2 miles of leks during the lekking season (required mitigation measure A).

Increased noise and human activity would occur during the up to 2-year construction and decommissioning phases (and as needed for maintenance throughout operation) from the use of construction machinery such as excavators, dozers, tractors, scrapers, pickup trucks, and dump trucks. A list of typical equipment for project construction and the estimated noise levels are detailed in the Lava

Ridge noise technical report (SWCA 2022), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). Noise could be up to 29.3 dBA (10 dBA more than existing background noise levels for unoccupied open rangeland, which is 19.3 dBA) within 6.8 miles of the siting corridors (Figure D-1 of Appendix D in SWCA [2022]) and attenuate to background levels beyond 6.8 miles. Only one occupied sage-grouse lek (4L152) was identified 3.1 miles from a project access road; as indicated in Table 3.3-24, noise levels at this location from construction traffic on the road would be 38.7 dBA (a 22.7-dBA increase over the assumed existing daytime noise level of 16 dBA; Table 3.3-26). Thus, MVE would be required to avoid repeated or sustained noise that is 10 dBA greater than baseline levels at the lek from 6:00 p.m. to 9:00 a.m. within 2 miles (3.2 km) of leks during the lekking season (required mitigation measure A). Construction and decommissioning of the project would each occur over 2 years. The project would be constructed (and decommissioned) following subphases for the Star Lake grazing allotment shown in Figure 2.4-3. No defined subphasing for the Sid Butte allotment would be included with Alternative B; construction within the Sid Butte allotment could occur at any time during the up to 2-year construction and decommissioning phases. The subphasing would concentrate human noise and activity from construction (and decommissioning) in North Star Lake, then South Star Lake, then West Star Lake. Based on known occupied lek locations, the greatest potential for indirect disturbance to sage-grouse would be during the North Star Lake subphase and also when equipment is in use in the Sid Butte allotment. As construction (and decommissioning) proceeds into the South and West Star Lake subphases, the intensity of this source of indirect disturbance would reduce.

Roadway traffic could also disturb or displace sage-grouse. Estimated noise levels from construction traffic at the closest occupied lek (approximately 3.1 miles from access road) would be 25.2 dBA for a traffic level of 400 vehicles per hour (SWCA 2022), a 9.2-dBA increase over the assumed existing daytime noise level of 16 dBA. The highest traffic load for the project would be 170 trips per hour during construction of Alternative B (see Table 2.4-3)]; traffic would reduce to 5 to 17 trips per hour during operation.

Impacts from oil and gas development at higher activity sites (i.e., drilling rigs) (Holloran 2005) and overhead power transmission and communication distribution lines (Manville 2004) to sage-grouse lek activity have been detected out to 3.73 miles (6 km). The HQT calculates the effects of indirect impacts due to wind energy out to 6 km when calculating loss of functional habitat because displacement of sage-grouse from noise and human activity during project operation could extend 3.7 miles farther than the ground disturbance footprint (Holloran 2005; State of Idaho 2021a) for turbines and transmission lines. No transmission lines would be located within 3.1 miles of occupied sage-grouse leks; however, turbines would be located within the 3.7-mile indirect effects area of occupied leks (though still outside the 3.1-mile lek buffer [see Table 3.3-24] in accordance with BLM [2015a]). The lek buffers would minimize but not eliminate impacts to sage-grouse during the breeding season, and leks 4L160, 4L159, and 4L152 could experience a decline in use, with the highest potential for impacts at lek 4L160. Sage-grouse avoidance of leks could result in reduction of activity or even loss of leks, which could reduce the density of occupied leks in this population. Lek buffers may not reduce impacts to nesting females or to females and their broods (Patricelli et al. 2013). The project could impact sage-grouse in spring, summer, and winter SUAs because there are no buffers required for these. The impacts of noise on nesting, brood-rearing, foraging, and wintering sage-grouse have not been evaluated; therefore, impacts cannot be predicted. Range improvements would occur within 2 miles of leks, as allowed per BLM (2015a:B-1). From HQT calculations, approximately 21 acres of temporary functional habitat loss would occur from indirect impacts such as project noise and human activity (see Table 3.3-25). Thus, mitigation with a required net conservation gain (BLM 2015a), as calculated by the HQT, would be used to offset impacts from the project to sage-grouse habitat.

During operation, no occupied leks would experience increased noise from the project (Table 3.3-26). However, noise was not measured for SUAs.

Table 3.3-26. Summary of Estimated Construction and Operation Noise Levels at Greater Sage-grouse Leks within 6.8 Miles of Siting Corridors

Lek ID	Lek Status	Background Noise Levels* Leq (dBA)	Project Construction Noise Contribution Leq (dBA)	Construction Potential Noise Increase Leq (dBA)	Project Operation Noise Contribution Leq (dBA)	Operation Potential Noise Increase Leq (dBA)
4L160	Occupied	19.3	29.3	10	0.0	0.0
4L152	Occupied	19.3	38.7	22.7	0.0	0.0
4L159	Occupied	19.3	29.3	10	0.0	0.0
4L008	Occupied	19.3	29.3	10	0.0	0.1
4L044	Unoccupied	19.3	29.3	10	0.0	0.0
2J010	Unoccupied	19.3	29.3	10	41.2	22.0
2J012	Unoccupied	19.3	29.3	10	38.7	19.5
2J013	Unoccupied	19.3	29.3	10	51.8	32.5
2J014	Unoccupied	19.3	29.3	10	32.2	13.2
2J021	Unoccupied	19.3	29.3	10	36.0	16.8

Source: SWCA (2022).

Note: Estimated noise levels during project operation at the perimeter of the sage-grouse leks (0.25 mile from the center of the lek). Values may not sum precisely due to rounding. L_{eq} (equivalent noise level) describes the energy average A-weighted noise level during the measurement period. Lek status is defined in Table 3.3-24.

* The analysis used a 16-dBA daytime residual level (7:00 a.m.–7:00 p.m.) and a 22-dBA nighttime residual level (10:00 p.m.–7:00 a.m.) (Blickley et al. 2012).

Although the effects of noise from construction (characterized by more frequent intermittent noise) and ongoing wind farm operation (characterized by more continuous noise) on sage-grouse have not been specifically studied, the type and level of this noise may be comparable to that of a natural gas drilling rig. Blickley et al. (2012) recorded noise from natural gas drilling rigs (continuous noise at 70 decibels [dB]) and played them at leks in Fremont County, Wyoming, at a volume that simulated a 0.2-mile (400-m) distance from the noise source. Compared to experimental controls, a 29% decrease in attendance of leks occurred over three breeding seasons. The effect of the noise was immediate and sustained, having the potential to affect the size and persistence of the local population due to fewer nests being initiated or nest abandonment, although lek attendance rebounded the year after the treatment was stopped. Blickley et al. (2012) also found that chronic intermittent noise (e.g., traffic) has a greater effect than continuous noise (e.g., drilling noise). It may be more difficult for species to adapt to chronic intermittent noise (Blickley et al. 2012). This is described in additional context in issue 3 below. Ambrose et al. (2021) evaluated the effects of noise from natural gas developments on sage-grouse lek attendance in Wyoming and found that noise levels at leks were associated with male sage-grouse attendance at these leks: the higher the noise level at leks, the higher the probability of decline in lek attendance by males. They suggest that the current policy restricting noise levels at leks to L_{A50} < 10 dBA over the background noise level is appropriate for minimizing effects of noise. The metric L_{A50} is one of the metrics used to describe existing sound level, defined as "the level of all sounds in a given area, including all natural and non-natural sound sources" (American National Standards Institute, Inc. 1988, 1994, as cited in Ambrose et al. 2021). Leks would be buffered from development of infrastructure (including transmission lines, turbines, and new roads) by 3.1 miles, which would minimize the effects of noise and roads during the breeding season at lek locations, though there still may be disturbance to nesting, brood-rearing, and winter SUAs (Patricelli et al. 2013). In Idaho studies, the average distance between a female's nest and the lek where she was captured ranged from 2.1 to 2.9 miles (3.4–4.7 km), which is within the lek buffer designated by BLM (2015a). However, lek buffers may not minimize impacts to nesting females, females with broods, or wintering sage-grouse as there are no buffers on SUAs.

In addition to required mitigation measure A, MVE's applicant-committed measures to reduce noise (measures 89 and 95) would minimize the potential for the project to degrade sage-grouse habitat by increasing noise. MVE would implement a blasting plan and require that all construction equipment be adequately muffled and maintained.

Even with MVE's applicant-committed measures and the required mitigation measures described above, residual effects to sage-grouse could occur due to temporary loss of functional habitat, in part due to increased noise and human activity (see Table 3.3-25). There may be additional impacts if unscheduled or emergency maintenance is required during the life of the project. Impacts from these activities would be similar to those expected during project construction. Therefore, compensatory mitigation to meet the net conservation gain requirement of BLM (2015) would be required (see Section 3.3.4.4).

Issue 3. How would the project affect how sage-grouse use habitat or how they move among habitats?

Effects of Wind Energy

Though the number of studies on the effects of wind energy on sage-grouse is increasing, there are still many knowledge gaps. Primary effects are thought to include increased noise; avoidance of humanmade structures; habitat fragmentation from roads, turbines, powerlines, and other associated infrastructure; and increased predation due to powerline perches for predators (Manier et al. 2013). The mechanisms for indirect effects are increased predation and loss of usable habitat because there is some evidence that sage-grouse avoid tall structures (LeBeau et al. 2019; Manier et al. 2014). These indirect effects are more likely than direct effects such as collisions with turbines (Manier et al. 2014). The indirect effects can also occur over a longer duration, such as through operation and maintenance. The presence of aboveground structures (new fences, transmission lines, etc.) indirectly affect sage-grouse demographics because tall structures provide perching opportunities for predators such as ravens and raptors, and low structures, such as fences, increase mortalities due to collisions (Manier et al. 2014). Habitat use by sage-grouse hens did not decrease near wind turbines in southern Wyoming in the nesting, brood rearing, or summer seasons (LeBeau 2012). However, the relative probability of sage-grouse selecting brood-rearing and summer habitats decreased as surface disturbance associated with infrastructure from wind energy development increased (LeBeau et al. 2017) and as energy development in general increased in another study (Kirol et al. 2020). Stronger avoidance, in terms of average distance from structures, was observed 3 to 6 years after project development, suggesting a lag in the population response to changes on the landscape (LeBeau et al. 2017), which is similar to responses documented in other disturbance studies (e.g., natural gas disturbance [Holloran et al. 2010]).

Johnson et al. (2012) conducted a preconstruction and postconstruction study on the effects of a wind energy development on sage-grouse in Carbon County, Wyoming, and documented decreased male attendance at all 14 leks within a 4-mile buffer of the wind energy development. Similar lek declines were noted in regional leks beyond the 4-mile buffer of the wind energy development throughout Carbon County. To supplement the studies of wind energy on sage-grouse, studies on two other grouse species are discussed here. Earlier work in Austria found forest-dwelling black grouse (*Lyrurus tetrix*) experienced declines in male lek attendance 5 years following development of a wind facility in Austria, and also documented collisions with wind energy infrastructure (Zeiler and Grünschachner-Berger 2009). In a species closely related to sage-grouse, nest site selection and nest survival of Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*) in eastern Idaho were not affected by proximity to or density of turbines at either the core use scale (60 hectares [148 acres]) or the breeding season home range scale (1,385 hectares [3,422 acres]) (Proett et al. 2019). However, turbine density did negatively affect chick survival during the first 6 weeks after hatching at the breeding season home range scale (Proett et al. 2022). When the number of turbines was greater than or equal to 10 turbines within 2.1 km of the nest (i.e., 4.8 km of occupied leks), the probability that a chick would survive to 6 weeks after hatching decreased by 50%, which may have negatively affected recruitment of young into the breeding population and ultimately population growth.

A decreased probability of nest and brood survival of sage-grouse has been detected within approximately 3.1 miles of turbines (LeBeau 2012) and during operation of energy development in general (Kirol et al. 2020), and is speculatively attributed to increased predation from the presence of human development and edge effects (indirect effects). (This is, in part, the basis for the required 3.1-mile lek buffer in Manier et al. [2014]) Edge effects result from the abrupt transition between two different habitat types, in this case, the undisturbed natural habitat and the areas disturbed by the installation of wind turbines, as well as installation of roads. In the same area, the proportion of habitat disturbed by wind energy facility infrastructure was a stronger predictor of decreased nest and brood survival than distance to turbine. This pattern suggests that habitat use in some seasons occurs around the edge of the wind energy facility and in less densely developed areas, but less so near the wind energy facility. The risk of sage-grouse nest failure or brood failure decreases with every 0.6-mile (1-km) distance away from turbines (LeBeau et al. 2014), though female survival does not appear to be related to wind energy infrastructure (LeBeau et al. 2019). Connectivity between SUAs was suitable (providing resources for multiple life stages over a majority of the fine-scale area) with much overlap between SUAs. This would reduce the suitability between SUAs present in the project area. The mechanism for effects of wind turbines versus transmission lines (discussed below) differs because use of turbines for perches has not been documented (Manier et al. 2014).

In addition to studies evaluating effects of proximity to energy development on sage-grouse, Kirol et al. (2020) evaluated the effects of the intensity of development (proportion of development within defined areas) on sage-grouse distribution and nest and brood survival in Wyoming. The study considered the effects of different levels of sustained disturbance associated with a variety of existing energy infrastructure and human activity from coal-bed natural gas, conventional oil and gas, wind development, and relatively unaltered areas across Wyoming. The study found decreased nest success associated with the amount of sustained disturbance within an 8-km^2 (3.09-$mile^2$) area, decreased brood survival for broods exposed to higher levels of sustained disturbance within a 1-km^2 (0.39-$mile^2$) area, and increased female avoidance associated with higher levels of sustained disturbance in an area. More than 90% of nest and brood locations were in areas with less than 3% sustained disturbance within a 2.7-km^2 (1.04-$mile^2$) area. Therefore, a decline is expected in the following: selection of nest sites by sage-grouse within nesting habitat in spring SUAs near the project, nest success for those that do nest in spring SUAs near the project, selection of brood-rearing habitat by sage-grouse in summer SUAs, and brood survival for broods that do use this area.

Connectivity between SUAs would be further reduced by siting corridors by fragmenting or removing sagebrush and would negatively impact sage-grouse distribution in this area.

Effects of Transmission Lines

Proximity to transmission lines has been shown to decrease demographic rates (e.g., nest success, brood survival, adult survival) and habitat use (Gibson et al. 2018; Kohl et al. 2019), though some of these effects may be minimized with best management practices. In Utah, presence of a new transmission line through winter habitat decreased sage-grouse use of that SUA immediately after construction (Hansen et al. 2016), although this effect was not sustained. The authors suggest that the negative effects of the line can be reduced by implementing best management practices such as co-locating transmission lines with existing lines, but this effect applies specifically to winter habitat use. Sage-grouse nest success, brood survival, lek use, and nest site selection decreased up to 1.5 miles from transmission lines in Utah, portions of southeast Idaho, and southwest Wyoming (Kohl et al. 2019). The effect of transmission lines appears to be larger than for the effect of distribution lines (Kohl et al. 2019). In these locations, smaller distribution lines do not appear to affect sage-grouse nest success, brood survival, or habitat selection. Transmission lines decreased pre-fledging chick survival, annual male survival, per-capita recruitment, and population growth 1.5 to 7.8 miles from the line. Percentage of sagebrush cover increased sage-grouse selection of sites despite powerlines being present, highlighting the importance of maintaining suitable sagebrush cover and the value of reclaiming sagebrush habitats near powerlines (Kohl et al. 2019).

The presence of transmission lines, compared with fences and aboveground structures, reduces sage-grouse brood habitat (Gibson et al. 2018). A spatial analysis of sage-grouse telemetry data from west-central Idaho detected significantly fewer occurrences of sage-grouse within 0.4 mile of overhead powerlines than areas modelled without powerlines (Gillan et al. 2013). A study of the effects of a 345-kV transmission line in Nevada on two sage-grouse populations over 10 years identified several demographic rates including nest survival, chicks surviving to breed, and population growth that declined up to 6.2 miles (10 km) from a transmission line; variation in the magnitude of the effect was largely explained by raven abundance that could vary annually (Gibson et al. 2018). Gibson et al. (2018) showed that habitats near powerlines were more productive immediately after construction, but pre-fledging chick survival, annual male survival, chicks surviving to breed, and population growth following construction declined lower than for sage-grouse farther away from powerlines, an effect that was associated with an increase in ravens. Raven abundance is associated with decreased sage-grouse population growth because they predate sage-grouse nests of eggs and young; raven abundance increases with increased anthropogenic infrastructure such as transmission lines and roads because these increase raven food (e.g., road kill) and opportunities for nesting (Howe et al. 2014). Project construction would include turbines, new roads, overhead 34.5-kV collector lines, 230-kV transmission lines, and 500-kV transmission lines in General HMAs. The numbers of these infrastructure in mapped sage-grouse SUAs are summarized in Table 3.3-25.

As per BLM (2015a), a number of mitigation measures would be required for all action alternatives to reduce the potential for overhead structures to impact to sage-grouse. MVE's applicant-committed measures would also reduce impacts as described below. MVE would bury collector lines where practicable (applicant-committed measure 29) and construct transmission lines and collector lines in compliance with APLIC standards (APLIC 2006, 2012) (applicant-committed measure 30). MVE would be required to bury powerlines, where feasible, within existing disturbance areas (required mitigation measure D) to avoid areas of new disturbance. In addition, the project would co-locate linear features within 1 mile of existing facilities (required mitigation measure F) and place infrastructure in locations where habitat has not been fully restored (required mitigation measure E) to minimize habitat disturbance. When practicable for collector lines, MVE would use tubular overhead structures to reduce the ability of birds to perch and to reduce risk of collision (applicant-committed measure 143). The BLM would require that aboveground facilities (buildings and other structures where birds could perch or nest) be equipped with structures or devices that discourage perching or nesting of raptors and ravens (required mitigation measure K). These measures would minimize the potential for overhead structures to provide perching mechanisms for sage-grouse predators or to influence sage-grouse survival.

Effects of Guy Wires and Fences

Guy wires and fences also present collision risk for sage-grouse. Temporary fences would be wildlife-friendly and could be electric. Impermeable chain-link fence would only be used around substations and buildings. Alternative B would add 395 miles of temporary fence (see Table 3.3-25). Fences near important habitats such as SUAs or areas of sage-grouse concentration (e.g., wintering areas), or that bisect movement corridors (e.g., low areas or passes used during migratory or seasonal movements), may also be of particular concern (Idaho Sage-Grouse Advisory Committee 2006).

The BLM would require sage-grouse-safe fences and restrict the construction of tall facilities and fences to the minimum number and amount needed (required mitigation measure L). Temporary fencing (e.g., ESR, drop down fencing) would be used where feasible (required mitigation measure S), and new wire fences would be avoided within 1.2 miles (2 km) of occupied leks (required mitigation measure R). If this is not feasible, MVE would ensure that high-risk segments are marked with collision-diverter devices or as latest science indicates, as required in Management Decision Livestock Grazing 13 (MD LG 13; BLM 2015a): "Prioritize removal, modification or marking of fences or other structures in areas of high collision risk following appropriate cooperation, consultation and coordination to reduce the incidence of GRSG mortality due to fence strikes (Stevens et al. 2012)." The closest project fence to an occupied lek would be 2 miles. MVE would install the minimum amount of fencing needed to ensure the safety and security of the project (applicant-committed measure 44). MVE would also install and maintain avian collision diverters on all guy wires/lines of existing or new temporary met towers, and where guy wires are necessary, appropriate guy guards would be installed at the base of the guy wires (applicant-committed measure 142). Self-supported structures would be used where possible to limit the use of guy wires (required mitigation measure I). These measures would minimize the potential for collisions with fences and guy wires.

Effects of Roads

Roads can affect sage-grouse by causing noise disturbance (see Alternative B [Proposed Action], Issue 2), fragmenting and altering habitat, increasing human presence (resulting in disturbance and displacement of birds), increasing the risk of collision with vehicles, potentially reducing nest initiation rates of hens (Lyon and Anderson 2003), or increasing the distance hens move to find nest sites (Lyon and Anderson 2003). Results of research into the effects of roads on greater sage-grouse are varied. In a study of 120 leks in Colorado, 42% of leks were more than 1 mile from the nearest improved road, but 26% of leks were within approximately 100 yards of a county or state highway, and two leks were on a road (Rogers 1964). The use of roads for lek sites has also been noted in other studies (Connelly et al. 2004). LeBeau (2012) found evidence for avoidance of roads by hens in the nesting and brood-rearing seasons at one study site, but not the other; avoidance by hens was documented at both sites during the summer season only. Nest success and nest site selection by hens declined the closer they nested to major (paved) roads in central Montana; these effects diminished past 1 to 2 km from roads (Smith et al. 2018). Kohl et al. (2019) also found inconclusive results regarding the effects of roads on sage-grouse and suggest this is because of the correlation of powerlines and roads. Roads are likely to be placed adjacent to powerlines, and it is challenging to separate out effects from each disturbance. Wann et al. (2022) showed that the density of major road lines (e.g., paved highways) negatively affected lek persistence of sage-grouse at a 3.2-km spatial scale across its entire distribution in the United States. Leks near major roads had a higher probability of decline. There is one major road (ID 24) that currently runs through the project area and divides lek 4L160 from leks 4L152 and 4L159 (see Figure 3.3-8). Higher volume and frequency of traffic on access roads within the project area may degrade further the quality of SUAs and connectivity between leks themselves and between leks and nearby SUAs. Lek 4L160, which is within the project area, has a higher probability to exhibit a decline in use and lek persistence.

In Wyoming studies, the probability of sage-grouse habitat use declined near major roads (state and federal highways and interstates) when assessed using a 0.6-mile exponential decay function (i.e., the effect diminishes with distance to the road past 0.6 mile; Manier et al. 2014). The increased use of habitat and decreased risk of mortality near roads, particularly county (gravel) and two-track roads, has been recorded, but this is generally confounded with the tendency for roads to be placed in quality habitat in flat or low elevation terrain (Manier et al. 2014). Lyon and Anderson (2003) suggest that light traffic disturbance (up to 12 vehicles/day) results in hens moving longer distances to initiate nests and reduces nest initiation rates. Roads are considered a long-term disturbance (Holloran 2005) that would occur throughout the life of the project. Traffic on project roads would be highest during the construction and decommissioning phases. Public access on these roads would be restricted during these phases, and public use is not expected to substantially increase from the existing level of use. During project operation, the new and improved roads would be open to public use following construction, which could increase the level of motorized access for hunters and other recreationalists that may either directly kill sage-grouse (via vehicle strikes or hunting [see Section 3.12 (Recreation) in EIS Appendix 15 for more detail]) or disturb or displace individuals due to human noise and activity. The BLM may choose to leave roads in place at project completion, and therefore the effects of the roads would be permanent. Increased indirect effects from roads facilitating higher predation rates due to habitat fragmentation would occur throughout the project. The miles of new road in mapped sage-grouse SUAs are summarized in Table 3.3-25.

To minimize direct impacts to sage-grouse and other wildlife, the BLM would require that MVE establish speed limits on BLM roads to reduce vehicle/wildlife collisions or design roads to be driven at slower speeds (required mitigation measure N). MVE would require project personnel to drive 25 mph or less on non-posted project roads, be alert for wildlife, and use additional caution in low-visibility conditions when driving any vehicle during all project phases (applicant-committed measure 33). MVE would maximize use of existing roads, thereby keeping new construction to a minimum (applicant-committed measure 37). Carpooling among construction workers would be encouraged to the extent practical in order to reduce the number of vehicles entering and exiting the site on a daily basis (applicant-committed measure 39). These measures would minimize the potential for sage-grouse to collide with vehicles and minimize disturbance from human activity such as noise.

Connectivity

New roads, fences, and other aboveground infrastructure would affect landscape and habitat connectivity and the ability of sage-grouse to move through the landscape. Landscapes with limited human development tend to show higher sage-grouse use and increased habitat selection because sage-grouse have large annual home ranges (> 373 square miles) and need large, intact landscapes (Smith et al. 2016). Roads, powerlines, or other infrastructure can fragment habitat or result in avoidance of habitat (Connelly et al. 2011) at multiple scales that could indirectly affect populations by reducing demographic rates such as adult survival, nest success, or brood survival. Functional connectivity, i.e., the effect of the landscape on animal movement between habitat patches, is important to the conservation of population diversity and viability (Row et al. 2018). Functional connectivity is summarized by the following characteristics: physical barriers to movement on the landscape, genetic connectivity, and an individual's willingness to move through unsuitable habitat. If genetic connectivity (i.e., the degree to which gene flow affects evolutionary processes within populations) is reduced, populations can become smaller, isolated, and at greater risk of extirpation (Lowe and Allendorf 2010), though these impacts can often be mitigated by targeted management actions (Mills and Allendorf 1996; Scott et al. 2010). Habitat thresholds (i.e., suitability of habitat), driven by sagebrush cover, have strong positive effects on functional connectivity. Suggested persistence thresholds for habitat are achieved at an average of 40% to 60% sagebrush cover at the landscape scale, defined at a resolution of 5 km (Knick et al. 2013; Row et al. 2018). When these habitat thresholds drop below 25%, functional connectivity of breeding habitat is reduced because this means habitat is degraded to the point that sage-grouse will not move through it to other habitat patches (Row et al. 2018). Maintaining habitat quality above the 25% threshold in Idaho is important to maintain functional connectivity. Low sagebrush cover below 30% impacts dispersal and reduces gene flow (Row et al. 2018).

Within the Timmerman Hills HAF boundary (the western portion of the project), the low sagebrush cover and lack of breeding activity in the western portion of the project suggest that the habitat threshold is already low in this area and sage-grouse are less likely to use it. Within the Timmerman Hills HAF boundary, sage-grouse movement south of the siting corridors has not been observed by IDFG or BLM biologists. Therefore, within the Timmerman Hills HAF boundary, functional connectivity for sage-grouse is likely not affected by the western portion of the project. Within the Craters of the Moon HAF boundary (eastern portion of the project), there is sage-grouse activity and movement north of the siting corridors and south of the highway. Alternative B places siting corridors between lek 4L160 and leks 4L152 and 4L159 and would affect connectivity between these leks, degrading habitat quality. ID 24 has likely already reduced connectivity because it runs between lek 4L160 and leks 4L152 and 4L159. The added infrastructure in this area from the siting corridors could further reduce connectivity and breeding activity at these leks. Furthermore, connectivity between leks 4L152 and 4L159 and other leks to the east and northeast could be reduced because of the siting corridors north of ID 24. Connectivity from these two leks to the east is moderately important for genetic pathways, i.e., genetic interchange between leks and likely movement pathways based on terrain, sagebrush cover, and disturbance (Cross et al. 2023). There is no evidence of important genetic pathways between lek 4L160 and leks 4L152 and 4L159 or between lek 4L160 and the area northeast and outside of the analysis area.

Functional Habitat Loss

Sage-grouse habitat use and activity at occupied leks closest to siting corridors (leks 4L152, 4L159, and 4L160) are anticipated to decrease as surface disturbance increases associated with infrastructure from wind energy development. The project would reduce the connectivity with and amount of SUAs available in the analysis area. The project would also reduce connectivity among leks 4L152, 4L159, and 4L160, and from these leks (particularly lek 4L160) to SUAs in the analysis area. Where these effects cannot be avoided or minimized, the functional habitat that would be lost is taken into account by the HQT described in Section 3.3.4.2.2 (Alternative B [Proposed Action]). The number of acres (debits) for which MVE would need to mitigate to result in a net conservation gain for sage-grouse has been calculated for each alternative (see Table 3.3-25). Alternative B would result in the most functional habitat lost.

Risk of Extirpation

Project disturbance would decrease breeding activity at lek 4L160 and likely reduce activity at leks 4L152 and 4L159, particularly for Alternative B. Alternative D presents the lowest risk of decreasing breeding activity at leks. Lek activity may reduce to the point where these leks are lost, particularly lek 4L160, which would reduce lek density in the analysis area. Disturbance from the project may increase the distance sage-grouse hens using leks 4L152, 4L159, and 4L160 move to find nesting and brood-rearing sites and would decrease the amount of winter habitat in winter SUAs. Individuals traveling farther to find seasonal habitat are more likely to incur higher costs due to higher energetic demands and suffer higher mortality due to predation when moving into unfamiliar areas (Yoder et al. 2004). Collectively, reduction in breeding activity at leks, possible reduction of lek density in the analysis area, and reduction in available habitat likely would result in declines in the sage-grouse population in the analysis area.

Alternative B requires the maximum amount of new infrastructure (number of turbines, miles of new roads, miles of new transmission lines) in General HMAs than all other alternatives (see Table 3.3-25). Even with MVE’s applicant-committed measures and the required mitigation measures described above (and detailed in Table App4-3 in EIS Appendix 4), residual effects to sage-grouse would occur due to degraded habitat function and connectivity from overhead structures, roads, and traffic (expressed as loss of functional habitat by the HQT; see Table 3.3-25). There may be additional impacts if unscheduled or emergency maintenance is required during the life of the project. Impacts from these activities would be similar to those expected during project construction. Therefore, compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for greater sage-grouse are summarized in Table 3.3-27 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.3-27. Mitigation for Greater Sage-grouse

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	K	a
100–119	B	t
89	C	nnn
95	P	ooo
29	D	–
30	E	–
143	F	–
44	L	–
142	R through W	–
33	A	–
37	N	–
39	–	–
159	–	–

Note: All measures are detailed in EIS Appendix 4.

RDFs that would minimize impacts to sage-grouse from the project are mitigation required by BLM policy measures B and C. These measures would minimize impacts from construction, operation, and decommissioning from noise and other disturbance for nesting hens, hens with broods, and wintering sage-grouse, whereas Alternative B only minimizes impacts to sage-grouse on leks during the breeding season.

For unscheduled or emergency maintenance, MVE would follow sage-grouse nesting and winter seasonal restrictions in nesting and winter use areas (BLM 2015a; see Figure 3.3-7), respectively, to the extent practicable. Winter restrictions noted in Measure C could be lifted if MVE collect HAF data and these data show that sagebrush cover in winter SUAs (see Figure 3.3-7) is not suitable for sage-grouse.

Under Alternative B with Additional Measures, construction and decommissioning of the project each would occur over 3 years. The project would be constructed (and decommissioned) following the seasonal timing restrictions for nesting and winter habitat that are detailed in BLM (2015a: RDFs 3 and 4) so that construction and decommissioning occur during times when disturbance would be least impactful to sage-grouse. The additional measures would ensure MVE's commitment to minimize the introduction and spread of weeds and reduce dust would be applied throughout the project. Overall, these measures would reduce the potential for impacts to sage-grouse from Alternative B. However, even with the implementation of these additional minimization measures, impacts to sage-grouse would remain, and compensatory mitigation measures (see Section 3.3.4.4) would address these.

3.3.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Impacts to Leks 4L152, 4L159, and 4L160

Alternative C would eliminate the project infrastructure nearest sage-grouse leks 4L152 and 4L159 and would implement the seasonal restrictions described in Alternative B with Additional Measures. This would reduce impacts relative to Alternative B, but sage-grouse habitat use and activity at leks 4L152 and 4L159 would still decline as traffic frequency and human activity increase in this area during project construction. Lek 4L160 would still be almost surrounded by infrastructure, which could cause a decline in activity and loss of this lek. Disturbance from the project may increase the distance sage-grouse hens using lek 4L160 move to find nesting and brood-rearing sites and would decrease the amount of available SUAs for lek 4L160. Individuals traveling farther to find seasonal habitat are more likely to incur higher costs due to higher energetic demands and suffer higher mortality due to predation when moving into unfamiliar areas (Yoder et al. 2004).

Connectivity

Effects on connectivity are similar to Alternative B but would be reduced. Alternative C would not include siting corridors north of ID 24 and therefore would avoid introducing elements that could disconnect 1) greater sage-grouse leks north of the highway from nesting and brood-rearing habitat to the northwest and 2) other known greater sage-grouse leks and seasonal habitat in the north part of the analysis area in Priority HMAs and Important HMAs. Alternative C still places siting corridors between lek 4L160 and leks 4L152 and 4L159 and would affect connectivity between these leks, degrading habitat quality, but not to the extent as in Alternative B. ID 24 has likely already reduced connectivity because it runs between lek 4L160 and leks 4L152 and 4L159. Similar to Alternative B, Alternative C would reduce connectivity between the sage-grouse population in the analysis area and Idaho leks/populations to the south, and between lek 4L160 and leks to the northeast identified as important areas in maintaining genetic connectivity locally and range-wide (Cross et al. 2023). However, there is no evidence of important genetic pathways between lek 4L160 and leks 4L152 and 4L159 or between lek 4L160 and the area northeast and outside of the analysis area. Under Alternative C, connectivity between leks 4L152 and 4L159 and the area northeast would not be affected. Connectivity from these two leks to the east is moderately important for genetic pathways, i.e., genetic interchange between leks and likely movement pathways based on terrain, sagebrush cover, and disturbance (Cross et al. 2023).

Functional Habitat Loss

Alternative C would have less total acres of ground disturbance and less acres of ground disturbance in SUAs and in sagebrush habitat than Alternative B (see Table 3.3-25). Alternative C would have the second-smallest area of permanent and total functional habitat loss, smaller than both Alternative B (250.3 acres less permanent loss, and 253.5 less total loss) and Alternative E (6.5 acres less permanent loss, even though Alternative C would have 1,686 acres more ground disturbance in General HMAs than Alternative E). This is because the ground disturbance for Alternative E would occur in higher quality sage-grouse habitat than Alternative C (see Habitat Suitability maps on pages 34 and 57 of EIS Appendix 7, HQT Analysis). Since the eastern part of the siting corridors has better habitat suitability, higher late brood-rearing suitability, and higher breeding bird densities, placing infrastructure in that area would be more impactful on sage-grouse than placing it in the western siting corridors (State of Idaho 2022, 2023; provided as EIS Appendix 7). Where effects cannot be avoided or minimized, the functional habitat that would be lost is taken into account by the HQT described in Section 3.3.4.2.2 (Alternative B [Proposed Action]). The number of acres (debits) for which MVE would need to mitigate to result in a net conservation gain for sage-grouse have been calculated for each alternative (see Table 3.3-25). Alternative B would result in the most functional habitat lost.

General HMA Disturbance

Alternative C requires less new infrastructure (number of turbines, miles of new roads, miles of new transmission lines) in General HMAs than Alternative B and Alternative B with Additional Measures, but more new infrastructure in General HMAs than Alternative D, Alternative E, or the Preferred Alternative (see Table 3.3-25). Alternative C would also have less miles of fences than Alternative B but more than Alternative D, Alternative E, and the Preferred Alternative.

Risk of Extirpation

Project disturbance would decrease breeding activity at lek 4L160, and there may still be a reduction in activity at leks 4L152 and 4L159 due to increased traffic and human activity in the area, though the effects of the project would likely not be as big as for Alternative B and Alternative B with Additional Measures. Lek activity may reduce to the point where these leks are lost, particularly lek 4L160, which would reduce lek density in the analysis area. Alternative C more greatly minimizes impacts to sage-grouse than Alternative B and Alternative B with Additional Measures because it does not include siting corridors north of ID 24 and includes seasonal restrictions. Alternative C would still reduce lek density and available habitat in the analysis area, which likely would result in declines in the sage-grouse population in the analysis area. Even with the reduction in functional habitat loss of Alternative C, residual effects to greater sage-grouse would occur. Therefore, compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Under Alternative C, construction and decommissioning of the project each would occur over 3 years. The project would be constructed (and decommissioned) following subphases described in Section 3.3.4.2.2 (Alternative B [Proposed Action]). Based on known occupied lek locations, the greatest potential for indirect disturbance to sage-grouse would be during the North Star Lake subphase and also when equipment is in use in the Sid Butte allotment. As construction (and decommissioning) proceeds into the South and West Star Lake subphases, the intensity of this source of indirect disturbance would decline.

All applicant-committed measures, required mitigation measures, and additional mitigation described for Alternative B with Additional Measures would also apply to Alternative C. Thus, in addition to the reduction in habitat loss and reduction in project infrastructure from the Alternative C siting corridor configuration, measures to avoid and minimize impacts would be implemented. This means that construction would follow seasonal timing restrictions for nesting and winter habitat that are detailed in BLM (2015a: RDFs 3 and 4) so that construction (and decommissioning) occurs during times when disturbance would be least impactful to sage-grouse.

3.3.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would eliminate the same siting corridors as Alternative C and additionally would not include most of the siting corridors east of Crestview Road, which would avoid development in areas that have higher sagebrush cover and provide functional sage-grouse habitat.

Impacts to Leks 4L152, 4L159, and 4L160

Alternative D would have the fewest impacts on leks 4L152, 4L159, and 4L160, and there would be a lower risk of declining activity at these leks and a lower risk of loss of these leks. Project disturbance may still decrease breeding activity at leks 4L152 and 4L159 due to increased traffic and human activity in the area, and possibly at lek 4L160, though these effects would be less intense than for the other action alternatives.

Connectivity

Alternative D would eliminate the project infrastructure nearest sage-grouse lek 4L160, which would reduce impacts on its connectivity to other leks and SUAs. Under Alternative D, connectivity between leks 4L152 and 4L159 and the area to the northeast would not be affected. Connectivity from these two leks to the east is moderately important for genetic pathways, i.e., genetic interchange between leks and likely movement pathways based on terrain, sagebrush cover, and disturbance (Cross et al. 2023). Similar to Alternatives B and C, Alternative D may still affect connectivity of the sage-grouse population in the analysis area with Idaho leks/populations to the south.

Functional Habitat Loss

The reduced project footprint would result in 646 less acres of habitat alteration in sagebrush with greater than 10% cover for work area ground disturbance and 223 less acres from infrastructure ground disturbance than Alternative B (see Table 3.3-25). Alternative D would also have the lowest amount of total functional habitat loss (732.1 to 484.8 less acres than the other action alternatives) and the least acres of ground disturbance in SUAs. Alternative D may reduce available winter habitat, but MVE would collect HAF data to determine if sagebrush cover in winter SUAs in the western portion of the project (within the Timmerman Hills HAF boundary; see Figures 3.3-6 and 3.3-7) is suitable for sage-grouse. If not, impacts to sage-grouse would be less than anticipated.

General HMA Disturbance

Alternative D requires less new infrastructure (number of turbines, miles of new roads, miles of new transmission lines) in General HMAs than Alternative B, Alternative B with Additional Measures, and Alternative C, but more new infrastructure in General HMAs than Alternative E and the Preferred Alternative (see Table 3.3-25). Alternative D requires the second-least miles of temporary fences.

Risk of Extirpation

Lek density is least likely to decline in the analysis area as a result of this action alternative. Collectively, with impacts on leks and less functional acres of habitat lost, Alternative D likely would cause less of a decline in the sage-grouse population in the analysis area. Seasonal restrictions would help minimize these effects, and lack of infrastructure north of ID 24 and near lek 4L160 would be helpful avoidance measures. Even with the reduction in functional habitat loss of Alternative D, residual effects to greater sage-grouse would occur. Therefore, compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Under Alternative D, construction and decommissioning of the project each would occur over 3 years. The project would be constructed (and decommissioned) following subphases described in Section 3.3.4.2.2 (Alternative B [Proposed Action]). Based on known occupied lek locations, the greatest potential for indirect disturbance to sage-grouse would be during the North Star Lake subphase. As construction (and decommissioning) proceeds into the South and West Star Lake subphases, the intensity of this source of indirect disturbance would decline.

All applicant-committed measures, required mitigation measures, and additional mitigation described for Alternative B with Additional Measures would also apply to Alternative D. Thus, in addition to the reduction in habitat loss and reduction in project infrastructure from the Alternative D siting corridor configuration, measures to avoid and minimize impacts would be implemented. This means that construction would follow seasonal timing restrictions for nesting and winter habitat that are detailed in BLM (2015a: RDFs 3 and 4) so that construction (and decommissioning) occurs during times when disturbance would be least impactful to sage-grouse.

3.3.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would have the smallest direct ground-disturbance footprint of the action alternatives. It would eliminate the same siting corridors as Alternative C and limit the project's 500-kV transmission line to a single route that would follow the alignment of existing transmission lines, which would minimize effects relative to putting infrastructure in a new location. Alternative E also would not include most of the siting corridors west of Crestview Road and south of the existing WEC, which is in sage-grouse SUAs.

Impacts to Leks 4L152, 4L159, and 4L160

Project disturbance would decrease breeding activity at lek 4L160 because it would be nearly surrounded by infrastructure, and there may still be a reduction in activity at leks 4L152 and 4L159 due to increased traffic and human activity in the area, though the effects of the project would likely not be as big as for Alternative B and Alternative C. Lek activity may reduce to the point where these leks are lost, particularly lek 4L160. Disturbance from the project may increase the distance sage-grouse hens using lek 4L160 move to find nesting and brood-rearing sites and would decrease the amount of available SUAs closest to lek 4L160. Individuals traveling farther to find seasonal habitat are more likely to incur higher costs due to higher energetic demands and suffer higher mortality due to predation when moving into unfamiliar areas (Yoder et al. 2004).

Connectivity

Effects on connectivity would be similar to Alternative C. Alternative E would not include siting corridors north of ID 24 and therefore would avoid introducing elements that could disconnect 1) greater sage-grouse leks north of the highway from nesting and brood-rearing habitat to the northwest and 2) other known greater sage-grouse leks and seasonal habitat in the north part of the analysis area in Priority HMAs and Important HMAs. Alternative E still places siting corridors between lek 4L160 and leks 4L152 and 4L159 and would affect connectivity between these leks, degrading habitat quality, but not to the extent as Alternative B. ID 24 has likely already reduced connectivity because it runs between lek 4L160 and leks 4L152 and 4L159. However, there is no evidence of important genetic pathways between lek 4L160 and leks 4L152 and 4L159 or between lek 4L160 and the area northeast and outside of the analysis area. Under Alternative E, connectivity between leks 4L152 and 4L159 and the area to the northeast would not be affected. Connectivity from these two leks to the east is moderately important for genetic pathways, i.e., genetic interchange between leks and likely movement pathways based on terrain, sagebrush cover, and disturbance (Cross et al. 2023). Similar to Alternative C, Alternative E would reduce connectivity between the sage-grouse population in the analysis area and Idaho leks/populations to the south but to a lesser extent than Alternative C. Under Alternative E, connectivity between leks 4L152 and 4L159 and the area to the northeast would not be affected.

Functional Habitat Loss

The reduced project footprint would result in 315 less acres of habitat alteration in sagebrush with greater than 10% cover for work area ground disturbance and 96 less acres from infrastructure ground disturbance (see Table 3.3-25) than Alternative B. Even though Alternative E would have less direct ground disturbance than Alternative B and Alternative C, the ground disturbance would occur in higher quality sage-grouse habitat (see habitat suitability maps on pages 34 and 57 of EIS Appendix 7, HQT Analysis) and result in the most functional habitat loss next to Alternative B. Since the eastern part of the siting corridors has better habitat suitability, including higher late brood-rearing suitability and higher breeding bird densities, placing infrastructure in that area would be more impactful on sage-grouse than placing it in the western siting corridors (State of Idaho 2022, 2023; provided as EIS Appendix 7). Thus, Alternative E would have 6.5 acres of more permanent functional habitat loss than Alternative C (535.9 acres), with permanent functional habitat loss of 542.4 acres, making it the second-largest area of functional habitat loss next to Alternative B (786.2 acres).

General HMA Disturbance

Alternative E requires less new infrastructure (number of turbines, miles of new roads, miles of new transmission lines) in General HMAs than Alternative B, Alternative B with Additional Measures, Alternative C, and Alternative D, and only requires more new infrastructure in General HMAs than the Preferred Alternative (see Table 3.3-25). Alternative E requires the third-least miles of temporary fences.

Risk of Extirpation

Alternative E may still reduce lek density, which likely would result in declines in the sage-grouse population in the analysis area. Alternative E further minimizes impacts to sage-grouse than Alternative B and Alternative C because it does not include siting corridors north of ID 24, includes seasonal restrictions, and has a reduced project footprint compared to these alternatives. Compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Under Alternative E, construction and decommissioning of the project each would occur over 3 years. The project would be constructed (and decommissioned) following subphases described in Section 3.3.4.2.2 (Alternative B [Proposed Action]). Based on known occupied lek locations, the greatest potential for indirect disturbance to sage-grouse would be during the North Star Lake subphase and also when equipment is in use in the Sid Butte allotment. As construction (and decommissioning) proceeds into the South and West Star Lake subphases, the intensity of this source of indirect disturbance would reduce.

All applicant-committed measures, required mitigation measures, and additional mitigation described for Alternative B with Additional Measures would also apply to Alternative E. Therefore, in addition to the reduction in habitat loss and project infrastructure from the Alternative D siting corridor configuration, measures to avoid and minimize impacts would be implemented. This means that construction would follow seasonal timing restrictions for nesting and winter habitat that are detailed in BLM (2015a: RDFs 3 and 4) so that construction (and decommissioning) occurs during times when disturbance would be least impactful to sage-grouse.

3.3.4.2.6 PREFERRED ALTERNATIVE

The types and duration of effects under the Preferred Alternative would be similar to Alternative B, but the magnitude of effects would likely be reduced. The Preferred Alternative would eliminate some of the western and northern siting corridors compared to Alternative B. The transmission line heading west from the siting corridors would be co-located with an existing line, causing the impact of this to be less than if it was a new disturbance.

Impacts to leks 4L152, 4L159, and 4L160

Project disturbance would decrease breeding activity at lek 4L160 because it would be nearly surrounded by infrastructure. Disturbance from the project may increase the distance sage-grouse hens using lek 4L160 move to find nesting and brood-rearing sites and would decrease the amount of available SUAs closest to lek 4L160. Individuals traveling farther to find seasonal habitat are more likely to incur higher costs due to higher energetic demands and suffer higher mortality due to predation when moving into unfamiliar areas (Yoder et al. 2004). There may still be a reduction in activity at leks 4L152 and 4L159 due to increased traffic and human activity in the area, though the impacts would likely not be as big as for Alternative B and Alternative C.

Connectivity

The Preferred Alternative would still decrease connectivity of the sage-grouse population in the analysis area with Idaho leks/populations to the south and northeast identified as important areas in maintaining genetic connectivity locally and range-wide (Cross et al. 2023). Effects on connectivity would be similar to Alternative C. The Preferred Alternative would not include siting corridors north of ID 24 and therefore would avoid introducing elements that could disconnect 1) greater sage-grouse leks north of the highway from nesting and brood-rearing habitat to the northwest and 2) other known greater sage-grouse leks and seasonal habitat in the north part of the analysis area in Priority HMAs and Important HMAs. The Preferred Alternative still places siting corridors between lek 4L160 and leks 4L152 and 4L159 and would affect connectivity between these leks, degrading habitat quality, but not to the extent as in Alternative B. ID 24 has likely already reduced connectivity because it runs between lek 4L160 and leks 4L152 and 4L159. However, there is no evidence of important genetic pathways between lek 4L160 and leks 4L152 and 4L159 or between lek 4L160 and the area northeast and outside of the analysis area. Under the Preferred Alternative, connectivity between leks 4L152 and 4L159 and the area to the northeast would not be affected. Connectivity from these two leks to the east is moderately important for genetic pathways, i.e., genetic interchange between leks and likely movement pathways based on terrain, sagebrush cover, and disturbance (Cross et al. 2023). Similar to Alternative C, the Preferred Alternative would reduce connectivity between the sage-grouse population in the analysis area and Idaho leks/populations to the south.

Functional Habitat Loss

The reduced project footprint would result in 401 less acres of habitat alteration in sagebrush with greater than 10% cover for work area ground disturbance and 178 less acres from infrastructure ground disturbance (see Table 3.3-25) than Alternative B. The Preferred Alternative would result in less total ground disturbance from siting corridors compared to all other action alternatives. However, the ground disturbance would occur in higher quality habitat. Since the eastern part of the siting corridors has better habitat suitability, including higher late brood-rearing habitat suitability and breeding bird densities, placing infrastructure in that area would be more impactful on sage-grouse than placing it in the western siting corridors (State of Idaho [2022a], provided as EIS Appendix 7, HQT Analysis). Even with disturbance occurring in higher quality habitat, the permanent loss of functional acres would be less than all other action alternatives except Alternative D. The Preferred Alternative would have 261.8 less acres of permanent functional habitat disturbance than Alternative B, 11.5 less acres of permanent functional habitat loss than Alternative C, 450.3 more acres of permanent functional habitat disturbance than Alternative D, and 18 less acres of permanent functional habitat loss than Alternative E.

General HMA Disturbance

The Preferred Alternative would result in the least amount of infrastructure (number of turbines, miles of new roads, temporary fences, miles of new transmission lines) in General HMAs compared to the other alternatives (see Table 3.3-25). However, the Preferred Alternative would disturb more acres of General HMA than Alternatives C, D, and E, only disturbing less acres than Alternative B.

Risk of Extirpation

However, the Preferred Alternative further minimizes impacts to sage-grouse than Alternative B and Alternative C because it does not include siting corridors north of ID 24, includes seasonal restrictions, and has a reduced project footprint compared to these alternatives. However, the Preferred Alternative still creates disturbance in higher quality habitat, especially compared to Alternative D. The Preferred Alternative may still reduce lek density, which likely would result in declines in the sage-grouse population in the analysis area. Compensatory mitigation to meet the net conservation gain requirement of BLM (2015a) would be required (see Section 3.3.4.4).

Under the Preferred Alternative, construction and decommissioning of the project each would occur over 3 years. Construction would be implemented in a phased construction schedule following seasonal timing restrictions for nesting and winter habitat that are detailed in BLM (2015a: RDFs 3 and 4) so that construction and decommissioning occur during times when disturbance would be least impactful to sage-grouse. Construction would be divided into three subphase areas: North Star Lake, South Star Lake, and Sid Butte (see Figure 2.4-4), as described in Section 2.8.2 (Construction Phasing). Based on known occupied lek locations, the greatest potential for indirect disturbance to sage-grouse would be during the North Star Lake subphase, when equipment is in use in the Sid Butte allotment, and when equipment is in use in the northeast corridors of the South Star lake subphase. As construction (and decommissioning) proceeds into the southwest portion of the South Star Lake subphase, the intensity of this source of indirect disturbance would decline. Construction in the Sid Butte and northeast portion of the South Star Lake subphase areas would occur from July to November to avoid impacts during nesting and winter seasons. This 5-month time period could be extended to 6 months to include December if the HAF data that MVE collects, following Stiver et al. (2015), show that winter SUAs do not meet the HAF criteria of suitable sage-grouse winter habitat.

3.3.4.2.7 CUMULATIVE IMPACTS

As described in Section 3.3.4.1.4, existing and future trends and actions have and will continue to influence greater sage-grouse populations in the analysis area through introduction and spread of invasive annual grasses, grazing, wildfire, vegetation treatments, seeding, conversion of lands to agriculture or rural residential, and development of energy infrastructure, particularly where those actions occur in suitable sage-grouse habitat (sagebrush). Climate change would continue to affect suitability of sage-grouse habitat, as described by Homer et al. (2015) and Rigge et al. (2021) who predict a reduction in suitable sage-grouse habitat in the future.

As described in Section 3.1.1 (Existing and Future Trends and Actions), future development would include construction of the SWIP-North transmission line and construction of the Gateway West transmission line. The 1,500-MW Taurus Wind Project is proposed on BLM public lands west of the siting corridors, and three solar projects are proposed in the western and southern portions of the analysis area. These projects would add more roads, fences, transmission lines, and human activity to the area. The trend for increased renewable energy development in the analysis area (see Section 3.3.4.1.4 [Existing and Future Trends and Actions]) and the potential additive or synergistic effects of other renewable energy projects (of similar size and scale) in combination with the Lava Ridge Wind Project would compound habitat loss and fragmentation on greater sage-grouse populations and their habitats. Additional construction and operation of projects would lead to more anthropogenic noise sources, fragmentation from roads and increased traffic on existing roads, and perching opportunities for sage-grouse predators. The potential effects of the expansion of wind and solar energy development on sage-grouse populations would depend on a number of site-specific variables at each project location, including the number and size of infrastructure; the number of acres of each project in General, Important, or Priority HMAs versus outside of designated sage-grouse habitat; and the implementation and effectiveness of avoidance, minimization, and mitigation measures to reduce impacts. The duration of these cumulative impacts would be approximately 84 to 86 years, which is the timeframe estimated for successful final reclamation of the sagebrush communities.

Impacts to leks 4L152, 4L159, and 4L160

As more sage-grouse habitat is disturbed and converted, sage-grouse activity and lek attendance may decrease. Regardless of future project development, leks 4L152, 4L159, and 4L160 (particularly lek 4L160) may eventually be lost as a result of the Lava Ridge Wind Project, though the risk of loss varies by action alternative. Future development of the projects described above would occur further from these leks but could add cumulatively to the risk of losing these three leks. Lek 4L160 would effectively be isolated with surrounding infrastructure if any of the action alternatives, except for Alternative D, are developed.

Connectivity

Connectivity between lek 4L160 and leks 4L152 and 4L159, as well as between lek 4L160 and the closest SUAs, would be reduced by the Lava Ridge Wind Project alone. With additional future projects in the region, connectivity with leks north and east of siting corridors, e.g., Big Desert and Craters of the Moon HAF fine-scale areas, is likely to be impacted. These areas have been identified as important areas in maintaining genetic connectivity locally and range-wide (Cross et al. 2018, 2023). With additional future projects in the region, connectivity to the south across the Snake River Plain would be reduced. Despite I-84, existing anthropogenic disturbance, and agriculture, there are still some low levels of genetic connectivity between the siting corridors and south across the Snake River Plain (Cross et al. 2023). The Lava Ridge Wind Project and additional future projects could decrease the remaining genetic connectivity across the Snake River Plain between the two contiguous landscapes and concentrations of genetic connectivity and importance for sage-grouse.

Functional Habitat Loss

Additional construction and operation of future projects would result in additional loss of functional habitat, but this would depend on site-specific variables at each project location. The amount of functional habitat that would be lost if the Lava Ridge Wind Project is developed varies widely among action alternatives (see Table 3.3-25); therefore, it would also vary when combined with future projects (see Table 3.3-28). Because the HQT has not yet been modeled for the future projects, this analysis uses acres of ground disturbance in the SUAs, acres of sagebrush habitat with more than 10% cover (Xian et al. 2015), and acres of General HMA. Considered together, the project and proposed future developments would result in further loss and degradation of sage-grouse habitat, likely causing habitat to retract further north in the analysis area, and further south for populations south of the Snake River Plains. Restricting the project and future development to this already-impacted area with reduced existing functional habitat may be the best option, compared to other potential locations, for minimizing these effects on sage-grouse.

Table 3.3-28. Cumulative Acres of Functional Greater Sage-grouse Habitat Affected when Combined with Other Reasonably Foreseeable Projects

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of ground disturbance in spring SUAs†	1,214	1,089	0	1,038	1,003
Acres of ground disturbance in summer SUAs†	1,680	1,518	500	971	992
Acres of ground disturbance in winter SUAs	18,035	17,406	16,197	16,758	16,776
Acres of ground disturbance in sagebrush habitat with > 10% cover*	4,740	4,448	3,857	4,329	4,161
Acres of ground disturbance in General HMAs	77,447	75,373	73,553	73,687	75,591

Notes: Acres of ground disturbance for the reasonably foreseeable future projects followed these analytical assumptions:

- Gateway South and SWIP-North would both be built within the same overall 250-foot-wide ROW; this analysis assumes the entire ROW acreage would have ground disturbance.
- Taurus Wind would have the same level of ground disturbance as estimated for Alternative B; the analytical assumption used was 5% of the Taurus Wind project boundary. It should be noted this project has not started its NEPA process yet, so this is a preliminary assumption, and if authorized, the ground disturbance could be more or less.
- The three solar projects would have an estimated 7 acres of ground disturbance per MW and were estimated at 500 MW each for a total of an estimated 10,500 acres disturbed. Note that these projects have not started their NEPA processes yet, so this is a preliminary assumption, and if authorized. the ground disturbance from these projects could be less.

† No additional acreage of spring or summer SUAs would be affected by reasonably foreseeable projects, so each affected acreage in Table 3.3-28 is the same as stated above for the alternatives evaluated in Table 3.3-25.

* Data from Xian et al. (2015).

Risk of Extirpation

The population in the analysis area would likely decline depending on the alternative selected for the Lava Ridge Wind Project and other proposed project specifics. Implementing avoidance, minimization, and mitigation measures, such as careful siting of corridors to avoid leks and seasonal habitat where possible, likely would reduce (though not eliminate) impacts on these populations, but not eliminate them.

However, the Preferred Alternative further minimizes impacts to sage-grouse compared to Alternative B because it does not include siting corridors north of ID 24, includes seasonal restrictions, and has a reduced project footprint. However, the Preferred Alternative still creates disturbance in higher quality habitat, especially compared to Alternative D. The Preferred Alternative may still reduce lek density, which likely would result in declines in the sage-grouse population in the analysis area. Compensatory mitigation to meet the net conservation gain requirement of BLM (2015) would be required (see Section 3.3.4.4).

Future projects on federal lands would be held to the mitigation standards (for residual impacts after avoidance and minimization have been considered) identified by the applicable land use plan. Currently, BLM (2015a) requires a net conservation gain, as discussed in Section 3.3.4.4 (Compensatory Mitigation). Net conservation gain would be determined by the BLM in coordination with the State of Idaho and informed by the Idaho HQT (State of Idaho 2021a). Projects on state lands would be held to the State of Idaho’s no net loss standard; no mitigation would be required for private lands.

Since Alternative B would have the most turbines, miles of transmission line, ground disturbance, and traffic, it would have the most cumulative impacts when combined with existing and future trends and actions. Alternative D would have the fewest turbines, miles of transmission line, ground disturbance, and traffic, and thus would have the fewest cumulative impacts.

3.3.4.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would result in irretrievable impacts to individual sage-grouse from noise and increased human presence; direct mortality from vehicle strikes and collisions with project infrastructure; and the loss, fragmentation, and degradation of their habitat over the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. A number of avoidance, minimization, and mitigation measures would be implemented to minimize the potential for these effects. Effects from noise, increased human presence, and direct mortality, as well as impacts to habitat quality from the presence of project infrastructure, would occur over the life of the project; however, these effects would not be considered irreversible because any residual habitat impacts would be offset through compensatory mitigation required by BLM policy (BLM 2015a) and thus would not result in a trend toward listing under the ESA or a loss of population-viability. The effects to greater sage-grouse from habitat loss and fragmentation could persist for an additional 50 years following decommissioning (84 years total) but would not be considered irreversible because the BLM would require compensatory mitigation to offset these impacts and because much of the habitat would be restored and reclaimed in the long term.

3.3.4.4 Compensatory Mitigation

Even with the implementation of applicant-committed measures and other mitigation described above (and in EIS Appendix 4), impacts to sage-grouse would remain. Thus, the BLM would require compensatory mitigation according to the mitigation framework described in the Mitigation Framework for Greater Sage-grouse section in EIS Appendix 4 (compensatory mitigation measure V) and outlined by

BLM (2015a). As described under issue 1 in Section 3.3.4.2.2, Alternative B, MVE is working with the BLM and the State of Idaho (Idaho Governor's Office of Energy and Mineral Resources, OSC, and IDFG) to use the Idaho HQT (State of Idaho 2021a) to identify and quantify potential impacts of project alternatives on greater sage-grouse habitat (required mitigation measure X The HQT quantifies impacts to sage-grouse habitat, which are expressed as a loss or gain of functional habitat. Debits or credits for mitigation are calculated by multiplying functional habitat loss or gain by a landscape importance factor, which is based on the type of HMA in which a project is located. In this case, the project is located entirely in a General HMA, which has a landscape importance factor of 1. Estimated mitigation debits using HQT outputs (State of Idaho 2022, 2023; provided as EIS Appendix 7) are provided in Table 3.3-29 to compare alternatives. Once an alternative is selected and if the BLM approves the project, the HQT would be rerun for the selected alternative to capture any changes or additional minimization measures applied to the project between draft EIS and the ROD. The project's draft Greater Sage-grouse Mitigation Plan is in Appendix U of MVE (2023).

After debits are calculated, MVE would work with the BLM and the State of Idaho to determine compensatory mitigation for residual impacts to result in a net conservation gain, as required in BLM (2015a). Compensatory mitigation for sage-grouse would follow *Idaho Sage-Steppe Mitigation Principles* (State of Idaho 2021b) and meet any requirements from BLM Mitigation Policy (BLM 2021a, 2021b) and BLM (2015a). Mitigation measure XIV would help offset impacts to greater sage-grouse: Using the HQT output from required mitigation measure X (Table App4-4 in EIS Appendix 4), compensatory mitigation would be determined by the BLM in coordination with the State of Idaho and informed by the Idaho HQT (State of Idaho 2021a) to meet the net conservation gain standard.

Table 3.3-29. Estimated Greater Sage-grouse Mitigation Debits by Action Alternative

HQT Mitigation Debits	Alternative B	Alternative B with Additional Measures	Alternative C	Alternative D	Alternative E	Preferred Alternative
Permanent debits (loss of functional acres)	785.5	515.8	535.3	74.0	541.9	524.4
Temporary debits (loss of functional acres)	21.3	14.3	18.1	1.3	17.7	17.5
Total	**806.8**	**530.1**	**553.4**	**75.3**	**559.6**	**541.9**

Source: State of Idaho (2022a).

3.4 CLIMATE AND GREENHOUSE GASES

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.5 CULTURAL RESOURCES

The issues analyzed in detail and the approach for the analysis are detailed in Table 3.5-1.

Table 3.5-1. Analysis Approach for Cultural Resources

Issue Analyzed in Detail	Issue 1: How would ground disturbance from the project physically impact cultural resources? Issue 2: How would the installation of new aboveground infrastructure cause non-physical impacts to cultural resources (i.e., with visual, auditory, or atmospheric effects)?
Associated Issue Analyzed in Brief	AIB-9: Would the project lead to increased dust and thus potential for impacts to cultural resources?
Analysis Area	Area of potential effects (APE) for physical and non-physical impacts to cultural resources, as defined by the SFO (pursuant to 36 CFR 800.16(d)) and further described in the draft cultural resources PA (EIS Appendix 8). The APE is the area where NRHP-eligible cultural resources, as defined in 36 CFR 60.4, could suffer diminished integrity by alteration or destruction as a result of physical or non-physical impacts from the project. This analysis area also includes cultural resources as addressed under ARPA, NAGPRA, and AIRFA. The *physical* portion of the APE (hereafter the physical APE) is the up-to-0.5-mile-wide turbine siting corridors, the ancillary siting corridors, and the range improvement corridors, as defined in Section 2.3.1 (Project Location, Siting, Landownership, and Jurisdiction), within which ground disturbance related to project construction, operation and maintenance, or reclamation could occur (see EIS Appendix 8). Therefore, the physical APE consists of an approximately 84,051-acre (131-square-mile) area within which 9,114 acres (14 square miles) of project disturbance from project facilities, turbines, transmission and collector lines, and access roads are proposed, and within which range improvements could be installed. Figure 3.5-1 depicts the physical APE for Alternative B, as summarized throughout this section, and shows the physical APE for the Preferred Alternative in comparison. Physical impacts to cultural resources could include project activities, such as ground disturbance from construction; seismic vibrations from blasting; and fugitive dust generation from traffic, helicopter use, and construction activities. Construction activities represent the greatest potential source of (permanent) physical effects on cultural resources. The *non-physical* APE, also referred to in the NHPA Section 106 consultation as the visual effects analysis area, was determined in conjunction with the project's NHPA Section 106 consultation process. This determination took into consideration multiple technical sources on visual impact threshold distances (including Pay et al. 2020[16] and Sullivan et al. 2012), applying the BLM's visual contrast rating (VCR) system (BLM 1986, as amended) as informed by Section 106 consulting party field visits, and contemplating previous projects of similar type and size. Per the PA, the *non-physical APE* would include a 20-mile buffer extending from the outer limits of the final authorized ROW where turbines would be placed and encompasses the physical APE (see EIS Appendix 8). The project ROW has not yet been determined; therefore, the non-physical APE applied to this EIS analysis encompasses a larger area than what the final non-physical APE will be pursuant to PA implementation. The non-physical APE, for the purposes of this EIS analysis, was developed by applying a 20-mile buffer to the project siting corridors for turbines and 500-kV transmission lines and includes areas within the project viewshed within that 20-mile distance zone (see EIS Appendix 8). Figure 3.5-2 depicts the non-physical APE for Alternative B, as summarized throughout this section, and shows the non-physical APE for the Preferred Alternative in comparison. As noted in Section 3.16, the viewshed analysis used GIS to model the approximate heights (base to blade tip) and approximate locations of 6-MW (740-foot-tall) turbines within the siting corridors. The viewshed analysis then incorporated those project components into the existing landform using digital elevation models to illustrate the areas from which the turbines could be visible within the landscape. The model does not account for atmospheric conditions, lighting conditions, time of year, vegetation, existing structures, and other landscape elements that could obstruct views. The viewshed model used for analysis of non-physical impacts to cultural resources therefore presents a worst-case (or maximum-case) scenario for impacts to cultural resources. The visual component of the non-physical APE consists of an approximately 1,809,080-acre (2,827-square-mile) area encompassing the viewshed from within the overall 2,050,486-acre (3,204-square-mile) 20-mile distance zone from the turbine and 500-kV transmission line siting corridors. According to the viewshed model, the project would potentially be visible from areas depicted in Figure 3.5-2 as the "visual component" (green areas) of the non-physical APE. The project would not be visible from areas without visual component coverage within the non-physical APE (where the green areas are not present in the non-physical APE in Figure 3.5-2). The physical APE is fully encompassed within the non-physical APE.

[16] Pay et al. (2020) provides a systematic approach developed by the BLM for evaluating and comparing the potential for adverse visual impacts to historic properties; sources are not intended to be exhaustive.

	Cultural resources identification efforts would proceed in the physical and non-physical APE pursuant to the PA (see EIS Appendix 8), where project components could result in physical or non-physical impacts. Cultural resources susceptible to non-physical impacts include those historic properties where, under Section 106 review, integrity of setting, feeling, or association contributes to the resource's NRHP eligibility. In particular, these non-physical impacts represent a potential source of disruption for certain cultural resources protected under AIRFA and for resources associated with Minidoka WRC for which the solitude and isolation of the area are important resource components (see Section 3.20 [Minidoka War Relocation Center and Minidoka National Historic Site] in EIS Appendix 9). Transmission structures, turbine towers, and turbine blades represent the most prominent sources of potential visual and auditory effects on cultural resources. Visual impacts would include the daytime visibility of vertical project structures and the nighttime visibility of aviation warning lights on turbines. Audible noise from project construction and decommissioning would be temporary, and transient in nature, lasting approximately 3 to 5 weeks at any given location (SWCA 2022). To lessen the noise impact from all construction equipment, it would have sound-control devices no less effective than those provided on the original equipment; the equipment would be adequately muffled and maintained (measure 95 in Table App4-2 in EIS Appendix 4). The auditory component of the non-physical APE, where noise from project operation could be perceptible, would extend up to approximately 2.2 miles from the turbine siting corridors and up to 0.5 mile from the 500-kV transmission line corridors (see Figure 3.5-2). Once the turbines and transmission lines are built, operational noise could persist throughout the 30-year project operation (see Section 3.6.1.2 regarding Noise; SWCA 2022). Atmospheric condition from project dust and emissions during construction, operation, and decommissioning would not exceed federal or state ambient air quality standards (see Section 3.2.1.2 and 3.2.2.2 [air quality impacts during construction and operation] in EIS Appendix 15) and would be further avoided or minimized through implementation of applicant-committed measures, required mitigation, and additional measures. See AIB-9 in EIS Appendix 3 for a brief discussion regarding dust abatement. Based on these factors, atmospheric project impacts to cultural resources are not analyzed in further detail. Consistent with Section 3.16.1.2 (Impacts, Visual Resources), visual impacts within the non-physical APE would be lessened with distance from the siting corridors, where distances of 0 to 2 miles are considered immediate foreground, distances of 2 to 10 miles are considered foreground, distances of 10 to 20 miles are considered middleground, and distances of 20 to 30 miles are considered background (see Figure 3.16-3). Non-physical visual impacts to cultural resources are analyzed within the immediate foreground, foreground, and middleground, whereas the background (beyond 20 miles) extends outside the non-physical APE for cultural resources. Non-physical audible impacts to cultural resources are analyzed within the immediate foreground and are part of the foreground effects (up to 2.2 miles from the siting corridors), whereas beyond this 2.2-mile zone, operational noise would no longer be perceptible (see Figure 3.5-2). Audible impacts to cultural resources would result from operational noise and could be perceptible up to approximately 2.2 miles from the siting corridors. The average person perceives an increase in sound of above 3 dBa as readily noticeable, an increase of 10 dBa as doubling of the sound, and an increase of 20 dBa as a dramatic change (SWCA 2022). For context, a sound level of 0 would be considered the threshold of hearing, a sound level of 30 dBa would be very quiet, a sound level of 60 dBa would be representative of normal conversation, a sound level of 90 dBa would be consistent with that of a heavy truck, a sound level of 120 dBa would be comparable to that of a loud rock concert as experienced near the stage, and a sound level of 150 dBa would be comparable to a jet taking off nearby (SWCA 2022:Table 2).
Indicators	See Sections 3.5.4 and 3.5.5.
Impacts Duration	Physical impacts would be permanent if cultural resources are not avoided. Because cultural resources are non-renewable resources, the impact duration for physical effects to cultural resources is long term. The impacts duration for non-physical visual impacts from vertical project infrastructure would be the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. The impacts duration for non-physical audible impacts (from turbines and transmission lines) would be the 30-year operation phase.
Data Sources	See Sections 3.5.4 and 3.5.5.
Regulatory Framework	*Cultural resources* are defined as "aspects of a cultural system that are valued by, or significantly representative of, a culture or that contain significant information about a culture. A cultural resource may be a tangible entity or a *cultural* practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places and as archeological resources, cultural landscapes, structures, museum objects, and ethnographic resources for [federal] management purposes" (NPS 2022a). Cultural resources are identified through field survey, historic documentation, or other sources such as oral history. For purposes of analysis under NEPA, cultural resources encompass *historic properties*, as defined in the NHPA; *archaeological resources*, as defined in the Archaeological Resources Protection Act (ARPA); and *cultural items*, as defined in the Native American Graves Protection and Repatriation Act (NAGPRA). ARPA and NAGPRA apply to archaeological resources and cultural items on federal lands. *Historic properties* as defined by the NHPA, are "any prehistoric or historic district, site, building, structure, or object included in, or eligible for, the [NRHP] maintained by the Secretary of the Interior" (36 CFR 800.16(l)(1)) (see Advisory Council on Historic Preservation [ACHP] [2022]). Historic properties may include cultural resources of

traditional religious and cultural importance to Native American Tribes (hereafter Tribes and with the same meaning as Indian Tribe in 36 CFR 800). NEPA provides an overarching consideration of the human environment to address these cultural, historic, and archaeological resources, properties, and items (collectively referred to as "cultural resources" herein).

To be eligible for the NRHP, a resource must generally be more than 50 years old; meet at least one of four criteria of eligibility; and possess sufficient integrity of location, design, setting, materials, workmanship, feeling, or association (36 CFR 60.4) (NPS National Register Bulletin 15, 1995 [NPS 1997]). Regulations for the listing of properties in the NRHP are provided by 36 CFR 60, whereas the process of formally determining the eligibility of properties is defined by 36 CFR 63 and guided by NPS National Register Bulletin 15. The four NRHP criteria are as follows:

- Criterion A: Event – Associated with events that have made a significant contribution to the broad patterns of our history
- Criterion B: Person – Associated with the lives of persons significant in our past
- Criterion C: Design/Construction – Embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction
- Criterion D: Information Potential – Has yielded, or may likely to yield, information important in prehistory or history

To retain integrity, the cultural resource will always possess several, and usually most, of the seven aspects of integrity recognized under the NRHP criteria, which comprise the following (from NPS 1997):

- *Location*: The place where the historic property was constructed or the place where the historic event occurred
- *Design*: The combination of elements that create the form, plan, space, structure, and style of a property
- *Setting*: The physical environment of a historic property
- *Materials*: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property
- *Workmanship*: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory
- *Feeling*: A property's expression of the aesthetic or historic sense of a particular period of time
- *Association*: The direct link between an important historic event or person and a historic property

Since the project would be located on public land managed by the SFO and would require a BLM ROW, the project constitutes a federal undertaking pursuant to Section 106 of the NHPA and its implementing regulations, as amended (36 CFR 800). Pursuant to NEPA and Section 106 compliance, as the lead agency for the project, the BLM is required to consider effects (or impacts in the terms of this EIS) on cultural resources from the undertaking. The regulations implementing Section 106 of the NHPA encourage the coordination of reviews under Section 106 with concurrent reviews under NEPA, ARPA, NAGPRA, and other authorities, such as the American Indian Religious Freedom Act (AIRFA) (36 CFR 800.3(b)). In their decision making pursuant to these laws, federal agencies have responsibility for Government-to-Government consultation with federally recognized Tribes. EO 13175 further provides guidance and directs the consultation and coordination with Indian Tribal governments. EIS Appendix 10 describes the consultation the BLM undertook with the Tribes and under NHPA Section 106.

NAGPRA (25 USC 3001 et seq.) applies protections to Native American human remains, associated funerary objects, sacred objects, or objects of cultural patrimony where these are identified on federal land. Other protections would apply for human remains (Native American or other) located on private or state land under Idaho Statute 27-500.

AIRFA (42 USC 1996) applies protections to Native American resources of religious importance where these resources are located on federal land. AIRFA further protects Native American access to their religious sites on federal lands. EO 13007 (May 1996: Indian Sacred Sites) also applies to Native American sacred sites on federal land and requires land managers—to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions—to 1) accommodate access to and ceremonial use of Indian Sacred Sites by Indian religious practitioners, and 2) avoid adversely affecting the physical integrity of such sacred sites.

The requirements of the NHPA would be met on the undertaking through Section 106 compliance. Section 106 compliance would be achieved for the undertaking through

- consultation with consulting parties (36 CFR 800.3);
- identification of cultural resources (36 CFR 800.4);
- assessment of impacts to cultural resources per the criteria of adverse effect (36 CFR 800.5); and
- the avoidance, minimization, or mitigation of adverse effects (36 CFR 800.6).

	The BLM, in coordination with the Idaho SHPO, ACHP, interested Tribes, and other consulting parties, is developing and consulting on a programmatic agreement (PA) consistent with 36 CFR 800.14(b)(3). The BLM has determined that "the effects on historic properties cannot be fully determined prior to approval of [the] undertaking" and therefore an alternate option (i.e., the PA) "for dealing with the potential adverse effects" is appropriate (36 CFR 800.14(b)(1)(ii), (b)(3)). The PA will address any cultural resource identification efforts and assessment of effects that could not fully be determined prior to the approval of the undertaking (36 CFR 800.14(b)(1)(ii)). In coordination with the NEPA review (36 CFR 800.8), execution of the PA prior to issuance of the ROD and implementation of the PA will complete the Section 106 process. Once executed, the PA will govern the undertaking and all of its parts (54 USC 306114). Further, the publication of this EIS acts as part of the public involvement process, meeting both the requirements of NEPA and Section 106 (36 CFR 800.2(d)(3)). NEPA and Section 106 consider adverse effects differently. Under NEPA, adverse effects are those that would be detrimental to the resource rather than beneficial. Under Section 106, effects to cultural resources are considered adverse when the federal undertaking could alter any of the characteristics that qualify the resource for the NRHP in a manner that would diminish the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5(a)(1)). Under NEPA and Section 106, adverse effects might be direct, indirect, or cumulative, including reasonably foreseeable effects caused by the undertaking that could occur later in time or be farther removed in distance (see 36 CFR 800.5(a)(1)). NEPA (42 USC 4331) Section 101(b) provides for the coordination of federal programs and functions, including to preserve important historic cultural and natural aspects of national heritage. Accordingly, the analytical framework for the project under NEPA includes consideration of potential impacts as they relate to adverse effects under Section 106, potential impacts to access to sites under AIRFA, potential impacts to cultural items under NAGPRA, and potential impacts to archaeological resources under ARPA.

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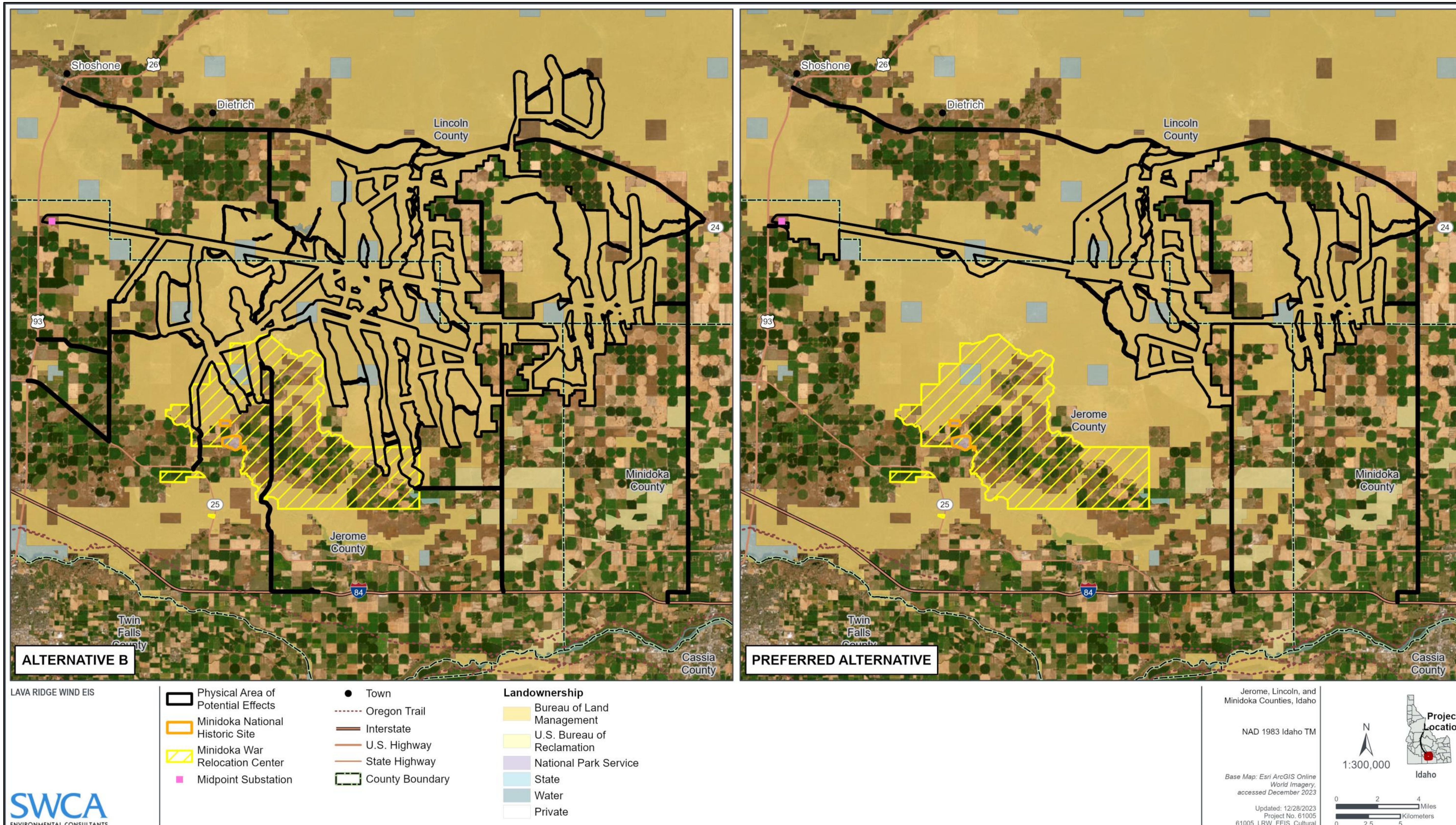

Figure 3.5-1. Cultural resources physical area of potential effects for Alternative B; showing the Preferred Alternative physical area of potential effects in comparison.

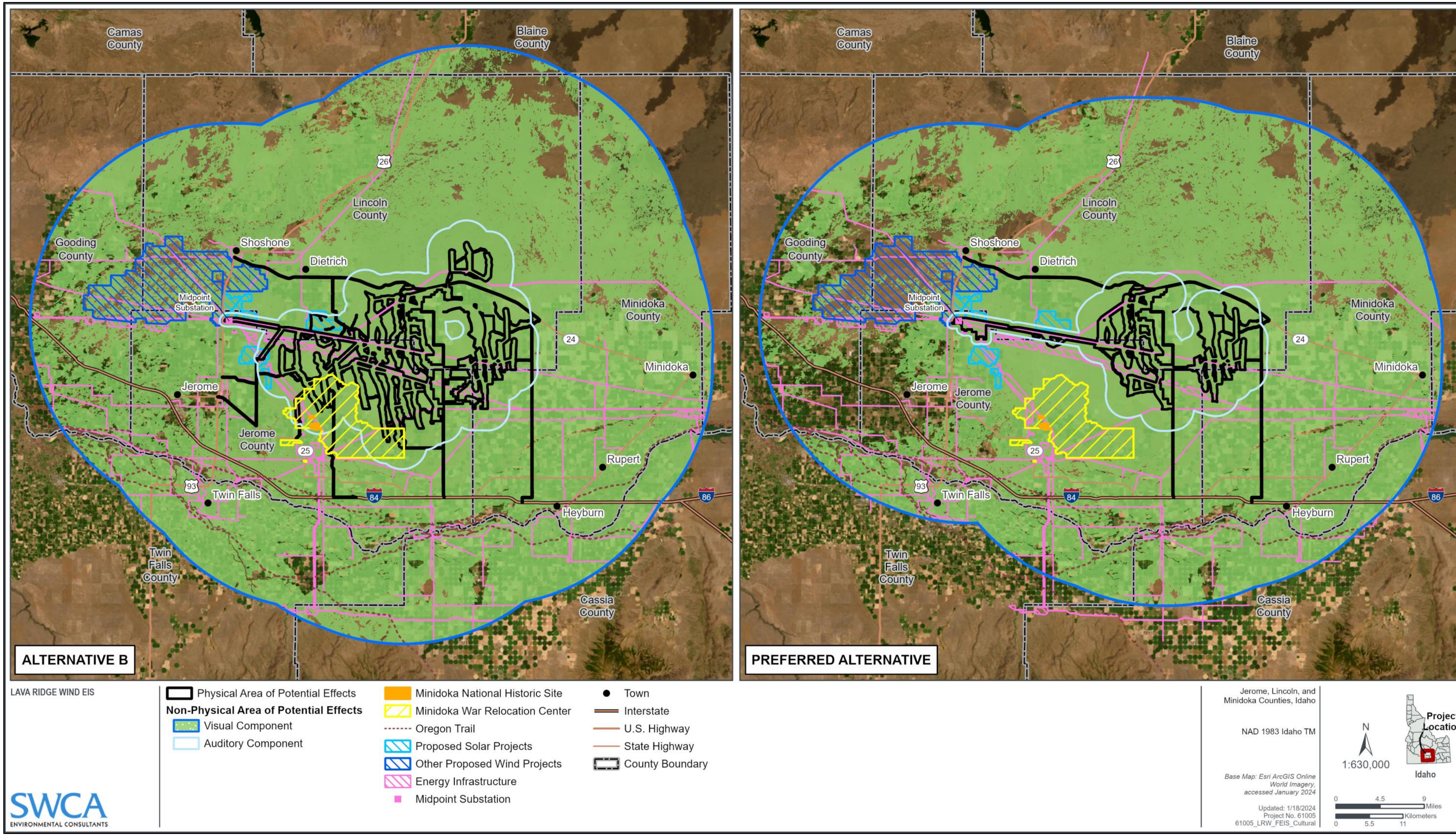

Figure 3.5-2. Cultural resources non-physical area of potential effects for Alternative B; showing the Preferred Alternative non-physical area of potential effects in comparison.

3.5.1 Native American Resources

Native American resources, as the term is used in this EIS, refers to 1) cultural resources or artifacts created by Tribes or cultures and to places and landscape features of significance to Tribes, whether or not these resources are subject to the NHPA, ARPA, or NAGPRA, and 2) natural resources (such as plants, animals, and minerals, or geographic features like buttes and caves) that are spiritually and culturally significant to Tribes (including cairns, stone circles, alignments, petroglyphs/pictographs, and rockshelters), and include resources for which Tribes have treaty-protected rights. Impacts to these resources could diminish Tribes' treaty rights or other rights as recognized under the AIRFA and EO 13007 (May 1996: Indian Sacred Sites) and those addressed under Joint Secretarial Order (JSO) 3403 and the *Memorandum of Understanding* (MOU) *Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty Rights and Reserved Rights* (ACHP et al. 2021).

The BLM SFO acknowledges resource concerns expressed by the Tribes and will consider each concern whether under NHPA Sections 106 and 110, AIRFA, EO 13007, NAGPRA, ARPA, NEPA, or other applicable requirements. Within the context of environmental justice, the interests and concerns of Tribes within the analysis area are further described in Section 3.6 (Environmental Justice and Socioeconomics).

Native American resource concerns for the project in the NHPA Section 106 review pertain especially to a resource's integrity of setting, feeling, or association from a Tribal perspective, even if the project is not directly visible or audible from that resource of concern. Impacts to the NRHP-listed Wilson Butte Cave (10JE6) have specifically been identified by Tribes and other consulting parties to be of heightened concern. Although a 1-mile setback was incorporated into the project design to avoid physical impacts to this significant cultural resource (MVE 2023:C-3), non-physical visual and auditory impacts would not be fully avoidable by the project. Figure 3.5-3 illustrates the simulated condition for Alternatives B and E (with 6-MW wind turbines) as viewed 2.5 miles to the east from KOP 10 (Wilson Butte Cave), on top of Wilson Butte Cave; however, the nearest turbine siting corridor would be 0.9 mile from Wilson Butte Cave. Native American concerns for project impacts viewed from landform features including other buttes, regardless of whether there are associated archaeological site components, have also been expressed in the NHPA Section 106 consultation. For to-scale simulations and viewing information for visual resources KOPs, including for the BLM's Preferred Alternative from KOPs 1, 2, 10, and 16, please refer to EIS Appendix 5 (Select Visual Resources Simulations) or the project visual resources technical report (SWCA 2024), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). Wilson Butte and Cave, Sid Butte, and other buttes and cultural resources of potential concern to Tribes are within the operational noise zone where project-related noise would occur (SWCA 2022).

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Figure 3.5-3. Visual resources KOP 10 (Wilson Butte Cave): simulated panoramic viewing condition, view facing east, under Alternatives B and E (with 6-MW turbines).

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Tribes have noted they would consider the presence of the project on the landscape severely impactful. The Shoshone-Bannock Tribes specifically voiced concerns that the project would impact traditional Tribal resources relating to hunting, gathering, subsistence, and other practices. The Shoshone-Bannock Tribes voiced concerns about severe cultural and spiritual impacts on their members, dark skies concerns related to turbine lighting that would present severe effects to Tribal practices in the area, and concerns for the diminishment of their exercise of treaty rights in the area. The Northwestern Band of Shoshone Nation described their specific concerns relating to the impacts to wildlife, to wildlife habitats and corridors, and to migratory birds as they all apply to the rights and trust responsibilities defined in their treaties. Tribes have expressed that they hold wildlife spiritually and culturally significant and that includes everything about the wildlife's lifeways (habitat, migration tendencies, mating, etc.). Vegetation is another aspect of the natural environment Tribes hold spiritually and culturally significant, and wild plants continue to provide a primary source of subsistence for many Tribal members. These resources and associated practices in some cases involve places in which Tribes hold treaty rights, as well as broader areas to which they ascribe cultural significance. Resources of cultural significance may include traditional cultural properties (TCPs) as defined in National Register Bulletin 38 (NPS 1998). Since TCPs are culturally sensitive, they often remain undocumented for confidentiality reasons, and all TCPs known by Tribes in the area may not be identified in the Class I study area (Power Engineers, Inc. [Power] 2021, 2022).

3.5.2 Minidoka War Relocation Center and Minidoka National Historic Site

Minidoka War Relocation Center (Minidoka WRC) and Minidoka National Historic Site (NHS) are in Jerome County, Idaho, within the cultural resources analysis area (see Figure 3.5-1). Minidoka WRC is a 34,000-acre WWII–era Japanese American incarceration site, known locally as Hunt Camp, and was established in 1942 under the authority derived from EO 9066 (Authorizing the Secretary of War to Prescribe Military Areas) on BOR land; a 388-acre portion of this original relocation center is managed within Minidoka NHS. Minidoka WRC represents one of the largest War Relocation Authority confinement sites. From 1942 to 1945, Japanese immigrants, Japanese Americans (Nikkei), and their families, including Alaska Native spouses and mixed Alaska Native and Japanese American children, were forcibly removed from their homes in Washington, Oregon, California, and Alaska, as well as other locations, and were incarcerated at Minidoka WRC (NPS 2006, 2016, 2022b). All incarcerees and their descendants, regardless of their racial or ethnic identity, are part of the broader Minidoka-connected community. The Japanese American and Minidoka-connected communities have more than two generations with cultural identity and traditions around Minidoka NHS. Of these approximately 34,000 acres making up Minidoka WRC, nearly 950 were residential and administrative areas, whereas the remaining area included extensive farm plots or were undeveloped high desert sagebrush steppe (NPS 2007).

See Section 3.20 in EIS Appendix 9 for detailed information regarding Minidoka WRC and Minidoka NHS. The project would be located within Minidoka WRC and within 0.9 mile of a Minidoka NHS undeveloped property and 1.5 miles from the Minidoka NHS Visitor Center. The NPS manages 388 acres of the original approximately 34,000-acre relocation center in Jerome County, Idaho (see Figure 3.5-1) (NPS 2016; 2022c). The surrounding landscape in Idaho, which currently comprises a mixture of federal, state, and privately owned land, is characterized by rolling hills of sagebrush, farms, and fields used for agricultural production and a network of irrigation canals and ditches (NPS 2016). Minidoka NHS is a nationally significant site (listed under NRHP Criterion A) related to civil rights and liberties and American history (NPS 2021:1). The site’s historical period of significance is the period of WWII from 1942 to 1945, spanning from the siting and construction of Minidoka WRC to the closure of the relocation center in 1945 (NPS 2007).

The following documents provide an in-depth review of the significance of Minidoka NHS and the incarceration experience of Japanese Americans and the Minidoka-connected community and are incorporated by reference:

- Minidoka Internment National Monument: General Management Plan (NPS 2006)
- Minidoka NHS foundation document (NPS 2016)
- Memorandum 1.D (PW-P): NPS Comments on the Notice of Intent for the Lava Ridge Wind Project (NPS 2021)
- Lava Ridge Wind Project Stakeholder Assessment and Engagement Report (BLM 2022)

The Civil Liberties Act of 1988 (Public Law 100-383) additionally granted limited reparations to Japanese Americans who had been incarcerated by the United States government during WWII, and the limits of these reparations reinforce the importance of preserving Minidoka WRC and the remembrance of its history and the people connected to it (BLM 2022). In the context of environmental justice, the interests and concerns of Japanese American and Minidoka-connected communities within the analysis area are further described in Section 3.6 (Environmental Justice and Socioeconomics). The BLM SFO acknowledges all concerns expressed by the Japanese American and Minidoka-connected communities and will consider each concern, as appropriate, whether under NHPA Sections 106 and 110, ARPA, NEPA, EO 14031, SO 3399, Public Law 109-441, or other applicable requirements.

The openness and undeveloped landscape are vital to the historic character and purpose of Minidoka NHS. These defining characteristics—expansiveness, remoteness, high desert, and agrarian terrain—convey the government's site-selection criteria for Minidoka WRC during WWII and evoke the long-lasting effects of that intentional decision-making process. The site still evokes vivid memories and strong emotions from survivors who were incarcerated there almost 80 years ago (BLM 2022). The project's physical APE overlaps up to 4,818 acres of Minidoka WRC (see Figure 3.5-1), and the entire Minidoka WRC is within the non-physical APE (see Figure 3.5-2), as the APE is defined in Table 3.5-1. As depicted on Figures 3.5-1 and 3.5-2, Minidoka NHS is outside the physical APE but within the non-physical APE.

A TCP associated with Minidoka WRC has been proposed by the Japanese American and Minidoka-connected communities, Friends of Minidoka, and National Parks Conservation Association. A study report for the TCP identifies the viewshed surrounding Minidoka WRC as the TCP and recommends it for listing on the NRHP. The Idaho State Historic Preservation Office (SHPO) has concurred with the eligibility of a TCP but seeks more information to support its significance and to establish an appropriate boundary. Although the Idaho SHPO has concurred with the Friends of Minidoka that there is an eligible TCP associated with the site that is significant under NRHP Criterion A, SHPO's concurrence indicated that more information would be needed to support significance under Criteria B and D, and that SHPO did not agree with the proposed boundary as defined in the study. Since a TCP is yet to be defined, the BLM analyzed impacts to historic properties within the current Minidoka NHS boundary. Figure 3.5-4 illustrates the simulated worst-case condition, estimated to occur up to 2% of the year due to prevailing wind direction, for Alternative B with 6-MW wind turbines, as viewed from KOP 1 (Minidoka NHS Visitor Center). Based on viewer orientation, the simulated turbines appear 1.7 miles from KOP 1. Figure 3.5-5 illustrates the simulated worst-case condition for Alternative B with 6-MW wind turbines based on viewer orientation from KOP 2 (Minidoka NHS Block 22 Barracks) at a nearest distance of 5.0 miles; although siting corridors would begin as near as 1.7 miles from KOP 2. Preferred Alternative simulations for KOPs 1, 2, and 16 within Minidoka NHS are included in EIS Appendix 5 and Appendix C of the visual resources technical report (SWCA 2024). See Figure 3.19-5 in Section 3.19.1 for the setting existing condition. The transmission line, as seen in the foreground of Figures 3.5-4 and 3.5-5, is existing infrastructure that is unrelated to MVE or the project. See also Section 3.20 in EIS Appendix 9 for additional details regarding the auditory affected environment.

The NPS has expressed concerns regarding the impact to dark skies above Minidoka NHS and regarding direct line of sight from the NHS to project lights; however, the Dark Sky Partners' 2022 report *An Assessment of the Impact of Lighting at the Proposed Lava Ridge Wind Project on the Night Skies at Craters of the Moon National Monument and the Minidoka National Historic Site* notes that overhead sky brightness impacts from the project would not be perceptible at Minidoka NHS (Dark Sky Partners 2022). An anticipated change in dark sky brightness on the horizon could occur and is described in Sections 3.5.5.2.2 and 3.16.2.2.2 and in Dark Sky Partners (2022). Noise was also a common concern expressed by the Japanese American and Minidoka-connected communities (BLM 2022). The acoustic environment is an important component of the natural and cultural resources at Minidoka NHS and has its own intrinsic value (NPS 2015). The NPS modeled predicted mean noise levels in 2015 at Minidoka NHS to be approximately 32 dBA (including the average existing sound level with the influence of humanmade sounds), which is 6.0 dBA above the natural ambient sound level (NPS 2015). The results of the noise impact assessment for the project (SWCA 2022) indicate that operational noise levels near Minidoka NHS would range from 4.6 to 12.5 dBA above existing background levels and would range from 4.0 to 16.2 dBA above existing background levels from within Minidoka WRC (see Section 3.6 [Environmental Justice and Socioeconomics] regarding noise impacts on the Japanese American and Minidoka-connected communities). As noted in Section 3.6, these operational noise levels are all below the EPA's recommended noise standard of 55 dBA for residential land uses. Although these are two different studies, SWCA (2022) modeled operational noise levels for the project would exceed the existing noise levels modeled by NPS (2015) for Minidoka NHS by approximately 0.5 to 8.5 dBA at two of the noise-sensitive areas (NSAs) within or near Minidoka NHS. See the Japanese American and Minidoka-Connected Communities subsection in Section 3.6.1.2.2 (Alternative B [Proposed Action]) for additional detail on potential noise impacts at Minidoka NHS and WRC during project construction and operations, as well as Table 3.5-1 for general project noise issues for cultural resources. MVE's applicant-committed measures 89, 90, 95, and 96 (see Table App4-2h in EIS Appendix 4) would be implemented during construction to minimize potential noise impacts for sensitive receptors in the analysis area.

3.5.3 Programmatic Agreement

The PA addresses cultural resource identification efforts and assessment of effects that are not fully determinable prior to the BLM reaching a decision regarding the undertaking (36 CFR 800.14(b)(1)(ii)). The BLM's implementation of the PA would be a requirement of the ROW being issued. The PA defines the inventory and evaluation methods that would be implemented before project construction. Further planning measures for avoidance, minimization, or mitigation of physical and non-physical impacts to NRHP-eligible cultural resources and resources of traditional religious or cultural importance to Tribes or TCPs—per NHPA Section 106 regulations—are specified in the PA (see EIS Appendix 8). The PA also includes measures to address any post-review discovery of unidentified subsurface cultural resources should they arise during ground-disturbing activities, including development of a monitoring and discoveries plan. The PA specifies steps by the BLM and other consulting parties to be taken before construction and during operation and maintenance of the project to comply with the NHPA.

The BLM will prioritize avoidance of adverse effects to historic properties. Where avoidance would not eliminate adverse effects, final measures for minimization or mitigation of adverse effects would be included in a HPMP and historic properties treatment plans (HPTPs) for specific properties, including but not limited to Minidoka NHS and Wilson Butte Cave, which would be developed pursuant to the stipulations of the PA. Measures under the PA to minimize and mitigate adverse effects would range across a variety of approaches for historic properties, including for Minidoka NHS and WRC and for TCPs or Tribal resources. These measures would serve to address physical, non-physical (visual, auditory, atmospheric), and cumulative impacts to cultural resources. Potential measures would include monitoring and addressing post-review discoveries, including inclusion of Tribal cultural specialists (see EIS Appendix 8).

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Figure 3.5-4. Visual resources KOP 1 (Minidoka NHS Visitor Center): simulated worst-case viewing condition under Alternative B (with 6-MW turbines).

Figure 3.5-5. Visual resources KOP 2 (Minidoka NHS Block 22 Barracks): simulated worst-case viewing condition under Alternative B (with 6-MW turbines).

3.5.4 Physical Impacts

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.5-2.

Table 3.5-2. Analysis Approach for Physical Impacts to Cultural Resources

Issue Analyzed in Detail	Issue 1: How would ground disturbance from the project physically impact cultural resources?
Analysis Area	The analysis area for this issue is the physical APE, as described in Table 3.5-1. The physical APE is where ground-disturbing project activities could occur and physically alter or destroy cultural resources in part or in whole. In terms of cultural resources, such impacts could alter the characteristics of the resource—including integrity of setting, feeling, or association—that make it eligible for the NRHP. These physical effects could also impact culturally important wildlife, vegetation, or waters in a manner that diminishes treaty rights or changes subsistence practices and cultural relationships to the wildlife and their habitats; see Section 3.18 (Wildlife) as well as Sections 3.15 (Vegetation), 3.17 (Water and Wetland Resources), and 3.18 (Wildlife) in EIS Appendix 15 for how these resource patterns or availability would be changed by the project. The physical APE comprises approximately 84,051 acres (131 square miles) and consists of siting corridors up to 0.5 mile wide within which project infrastructure would be located. These corridors allow for micro-siting of infrastructure to avoid physical impacts to cultural resources identified within the siting corridors through 1) a review of existing cultural resource information, information from consulting parties, and data collected in field surveys (which would occur in accordance with the PA prior to a notice to proceed for construction), or 2) through ground-disturbing project activities.
Indicators	Estimated site density within the acreage of the physical APE. Number of known cultural resources to be physically impacted by the project. Impact indicators will be evaluated in accordance with Section 106 of the NHPA and NEPA regulations and guidance.
Impacts Duration	If not avoided, the impact duration for physical effects to cultural resources is long term because cultural resources are non-renewable resources. Physical impacts would be permanent.
Data Sources	MVE's Class I reports (i.e., existing information inventory per BLM Manual H-8110.21A [BLM 2004]) (Power 2021, 2022), including the following: • Idaho SHPO/Idaho State Historical Society Cultural Records Office and Idaho BLM SFO, Twin Falls District spatial and tabular file search data (including the results of previous Class III field study [meeting intensive field survey requirements per BLM Manual H-8110.21A], within the project footprint and overall analysis area) • BLM General Land Office plat maps • NRHP database • NPS national historic trails and national historic landmarks and park studies • ACECs information on file with SFO Section 106 consultation information provided to the BLM through Tribal consultation, public, and consulting parties outreach, DOI Office of Collaborative Action and Dispute Resolution consultation with Japanese Americans (see BLM [2022]), and requests from local government and historical societies. BLM cave location data. MVE's *Class III Archaeological Resources Inventory for Geotechnical Survey Activities for the Lava Ridge Wind Project in Jerome, Lincoln, and Minidoka Counties, Idaho* (SWCA 2023).
Assumptions or Approach	The Class I report study area for physical effects included the area within a polygon drawn around the outer extent of the original project turbine and transmission line siting corridors (Power 2021; see EIS Appendix 8). The project design has since changed, and the Class I report study area for physical effects now covers areas in which project siting corridors are no longer proposed and does not fully encompass all currently proposed siting corridors (the physical APE) because some corridors now extend beyond the outer limits of the study area polygon. Power (2021) identifies 362 cultural resources in its study area. Of these cultural resources, 139 are in the physical APE. All 362 cultural resources in the Class I report study area (Power 2021) are incorporated into the non-physical impacts analysis; see Section 3.5.5. An addendum to the Class I report (Power 2022) identifies an additional 5,096 cultural resources in investigation of the non-physical APE. Of these cultural resources identified in the addendum report, 60 are within the physical APE for the project and are incorporated into the current analysis of physical impacts. A total of 57 cultural resources were identified during the Class III geotechnical field study for the project conducted on behalf of MVE (SWCA 2023), consisting of 10 previously recorded sites and two previously recorded isolates that were accounted for in the Class I report study area (Power 2021) and 45 newly identified sites. The two previously recorded isolated resources are now redefined as sites and treated as newly identified cultural resources sites (SWCA 2023). Of the 47 newly identified cultural resources for the geotechnical field study, 42

	resources are in the physical APE for the project and the remaining five are in the non-physical APE. These 42 resources, along with the 139 resources from the Class I report (Power 2021), 60 resources from the Class I addendum report (Power 2022), two others in the physical APE, and four identified by the BLM in Minidoka WRC, account for a combined 243 previously recorded cultural resources located within the physical APE.

3.5.4.1 Affected Environment

Approximately 17% of the physical APE has received previous cultural resource field surveys, and 243 cultural resources have been previously recorded within the physical APE. Cultural resources in the physical APE encompass a wide range of site types (Power 2021; SWCA 2023; Appendix 6 of EIS Appendix 8). Prehistoric resources include lithic scatters, lithic and tool scatters, campsites, and rock features consisting of cairns, stone circles, alignments, petroglyphs/pictographs, and rockshelters, including Kimama Butte Cave. Historic resources include artifact scatters/dumps, farmsteads, homesteads, houses, buildings, a rock habitation structure, a campsite, a barge, bridges, linear features (e.g., railroads, roads, transmission lines, and ditches/canal segments and irrigation-related features, some of which are located within and are components of the Minidoka Gravity Division and North Side Pumping Division Historic Districts), cairns, and a railroad campsite. Multicomponent resources within the physical APE include a combination of the aforementioned site types. Of the 243 previously recorded cultural resources within the physical APE, 91 are NRHP-eligible resources (two of which are listed in the NRHP), 20 remain unevaluated for the NRHP, and 132 have either been recommended or determined not eligible for the NRHP. Although no designated TCPs have been previously recorded in the physical APE (Power 2021), data sources indicate that these 243 previously documented resources include at least 12 sites that contain feature types known to be of potential traditional or religious cultural significance to Native Americans.

Parties participating in the initial project scoping and Section 106 consultation processes additionally commented regarding several cultural resources of potential concern within the physical APE, including the following:

- Caves, buttes, and lava tubes with cultural resource components
- Petroglyph/pictograph sites
- Archaeological sites
- Post-contact structures
- Native American resources
- Minidoka WRC–related resources and landscape

These resources are addressed within the analysis of physical impacts to cultural resources in the APE.

Approximately 9,114 acres (14 square miles) of disturbance are estimated within the siting corridors for the purpose of this analysis. Within the larger physical APE, within which project disturbance would be located, 14,568 acres have received 28 previous cultural resource field surveys of greater than 10 acres in area, equating to approximately 17% survey coverage within the physical APE. These 28 surveys represent large block survey resource identification efforts in the area that would be comparable to the large scale of the project's siting corridor acreage. Within these 28 surveys, 58 of the 243[17] cultural resources described above were identified. Based on these previous surveys, cultural resource sites occurred at the approximate frequency of three sites per square mile in those previously surveyed areas of

[17] The remaining 183 cultural resources were previously recorded via survey efforts of fewer than 10 acres, or there was no geospatial information available for these resources for this analysis.

the physical APE. This would result in an estimated potential for 43 total cultural resource sites to be present in the 14 square miles of project disturbance. Future cultural resources survey for these areas of project disturbance within the siting corridors, per stipulations of the PA, is planned to identify and evaluate cultural resources within this area, and to assess potential physical (and potential non-physical) impacts to those resources evaluated as NRHP-eligible or those that contain features of potential significance to Tribes. This additional work will be conducted under the NHPA Section 106 process for the project, prior to notice to proceed for construction.

Appendix 6 of EIS Appendix 8 summarizes the cultural resources identified in Power (2021), Power (2022), and SWCA (2023) that are within the physical APE and that could be physically impacted as a result of ground-disturbing project activities associated with the action alternatives, if not avoided.

Since this draft EIS was published (January 2023), a geotechnical investigation was conducted by MVE in 2023 as part of a separate application for a special use permit to perform geotechnical testing in and around the siting corridors to inform the engineering design of the project. The associated 2023 Class III survey results (SWCA 2023) have been reviewed. This survey partially overlaps the siting corridors in some cases, with the remaining extent extending beyond the siting corridors within the non-physical APE. The geotechnical investigation represents scattered small survey areas (less than 10 acres) rather than large block survey areas that would be comparable to the project's siting corridors. The Class III survey acreage for the geotechnical investigation is therefore not numerically significant and is accordingly not added to the percent of survey coverage within the physical APE noted above. However, the newly identified cultural resources located during the geotechnical investigation are added to the previously recorded cultural resources analyzed in this EIS and are accordingly reflected in Appendix 6 of EIS Appendix 8. Similarly, four cultural resources newly identified by the BLM in 2023 are added to the previously recorded cultural resources analyzed in this EIS and are accordingly reflected in Appendix 6 of EIS Appendix 8. Three of these cultural resources are associated with Minidoka WRC (see EIS Appendix 13).

3.5.4.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have likely impacted or would have ongoing impacts on cultural resources in and near the physical APE. Impacts physically altering cultural resources by introducing ground-disturbing activities include trends and actions such as agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. In addition, linear features with permanent access roads increase the opportunity for motorized access throughout the area, potentially increasing access to sensitive cultural resources, which could result in ground disturbance or removal of cultural materials.

Existing and future trends and actions on federal lands, under federal funding, or under federal permitting would be subject to cultural resources identification and assessment of effects to cultural resources in compliance with ARPA and NHPA Section 106. These surveys also assist in informing Government-to-Government consultation with federally recognized Tribes (in accordance with EO 13175 and 36 CFR 800) and in identifying cultural resources on federal lands of significance to Tribes to which NAGPRA or AIRFA and EO 13007 may apply. JSO 3403 and the MOU *Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty Rights and Reserved Rights* (ACHP et al. 2021) would also be applied by the DOI in regard to Tribal treaty rights. Based on the results of those surveys, impact assessments, and Tribal consultation, the lead federal agency would require the avoidance, minimization, and mitigation of adverse effects to these resources. Where federal permitting and law do not apply (e.g., on state or private lands), cultural resources identification efforts might not occur, and impacts might go unmitigated.

The approximately 34,000-acre Minidoka WRC would primarily include ongoing activities with agricultural cultivation and grazing as well as contain linear infrastructure, such as irrigation structures, pipelines, and overhead transmission lines. The 388 acres of Minidoka NHS within this area would largely be excluded from these types of activities; however, these ongoing and future activities would likely be visible within its setting. Where future activities involve federal lands, funding, or permitting, compliance with federal laws will apply. Where non-federal activities occur on non-federal lands within the approximately 34,000-acre area, cultural resources identification efforts might not occur, and impacts might go unmitigated.

As described in Section 3.1.1 (Existing and Future Trends and Actions), future development is likely to include improvements to U.S. 93 between I-84 and ID 25, improvements to the I-84/ID 50 interchange, construction of the SWIP-North transmission line, and construction of the Gateway West transmission line. The 1,500-MW Taurus Wind Project is proposed on land west of the siting corridors, and the 800-MW Salmon Falls Wind Project is proposed on federal lands 30 miles south of the project. Although these projects would add more roads, fences, transmission lines, and human activity to the area, none of these would introduce new disturbances within the physical APE (see Figures 3.1-1 and 3.5-1).

3.5.4.2 Impacts

3.5.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and cultural resources and the Tribes' access to resources described under Treaties would only be physically impacted by existing and future trends and actions. Where existing and future trends and actions occur on federal lands or under federal permitting, impacts to cultural resources would be resolved in accordance with federal law. Off federal land and without federal funding or permitting, trends and actions are likely to have impacted or likely would impact cultural resources, and these impacts are likely to go unmitigated.

3.5.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction, operation and maintenance, decommissioning, and reclamation activities could cause physical impacts to cultural resources, including Tribal resources described under Treaties. Under Alternative B, physical impacts to cultural resources could include project activities, such as ground disturbance from construction, seismic vibrations from blasting, and associated fugitive dust generation. These activities could destroy or alter the characteristics that qualify the cultural resource for the NRHP. In coordination with the BLM, MVE (Appendix S in MVE [2023]) is also considering range improvement areas that would concentrate cattle travel paths, congregation, and ranging, which could result in increased near-surface disturbance and possibly erosion at cultural resources in the physical APE. Cultural resources within the siting corridors or range improvement areas, where physical impacts could occur, could be exposed to physical impacts from ground-disturbing project activities. The 243 previously recorded cultural resources within the siting corridors are presented in Appendix 6 of EIS Appendix 8. On average, three cultural resources per square mile are estimated within the siting corridors, resulting in potentially 43 cultural resources occurring in the 9,114 project ground disturbance acres (14 square miles). These 43 sites would be from any of the prehistoric, historic, and multicomponent resource site types introduced under Section 3.5.4.1 (Affected Environment).

Physical project effects to cultural resources that are determined to be significantly adverse under NEPA and NHPA would necessitate avoidance, minimization, or mitigation. The PA for the project was developed in accordance with Section 106 (36 CFR 800.14) to address the further identification of cultural resources in the APE, ensure consideration of effects on cultural resources in the APE, and direct the treatment of NRHP-eligible cultural resources to a resolution of adverse effects using an HPMP, HPTPs, and a monitoring and discovery plan (see EIS Appendix 8). As a PA specification, intensive cultural resources field surveys would proceed within areas of proposed project ground disturbance in the siting corridors prior to the notice to proceed for construction. Cultural resources identified during the surveys within the physical APE could be physically impacted by the project, unless avoided. Cultural resources that could be adversely affected would have those adverse effects addressed before the project would proceed near that cultural resource (under the PA provisions, pursuant to the implementing regulations of Section 106 of the NHPA [36 CFR 800.6]). Additionally, other previously unidentified cultural resources, such as buried archaeological materials, could be discovered through ground-disturbing activities. Any adverse effects to discovered cultural resources during implementation of project would be addressed in accordance with the monitoring and discovery plan under the PA.

MVE's applicant-committed measures, required mitigation, and additional measures (Table App4-2 in EIS Appendix 4) would be implemented, supporting the avoidance and minimization of impacts to cultural resources (see Table 3.5-4). However, all cultural resources may not require avoidance or minimization of physical impacts. Typically, archaeological resources that do not have further research value and are not ascribed Tribal significance, and aboveground buildings or structures that are not important due to their historic design or connection to events in history, would not require avoidance, unless additionally protected under AIRFA, NAGPRA, ARPA, or similar laws and policies described in this EIS. MVE's applicant-committed measures (see EIS Appendix 4) 1, 2, 3, 4, 6, 7, 14, 17, 31, 33, 37, 38, 43, 44, 49, 66, 75, 82, 85–88, 90, 92, 97, 99, 113, 116, 118, 119, 120, 123, 129, 130, 132, 135, and 136, when implemented, would reduce potential physical impacts to cultural resources in the analysis area. The BLM would further require mitigation measures D, E, H, and J applicable to cultural resources (see EIS Appendix 4). Other measures for avoidance, minimization, and mitigation for resolving adverse effects to cultural resources are addressed in the PA (see EIS Appendix 8 and Section 3.5.3) and will be included in the HPMP and HPTPs and in the monitoring and discovery plan tiering to the PA.

Additionally, Alternative B was sited to avoid physical effects to Wilson Butte Cave (MVE 2023:C-3) and Minidoka NHS, which are NRHP-listed cultural resources. The nearest wind turbine would be set back 0.9 mile from the Minidoka NHS boundary and 1.7 miles from the Minidoka NHS Visitor Center (KOP 1) in the project layout design. From Wilson Butte Cave, the nearest wind turbine would be set back farther than 1 mile. Other action alternatives increase some setbacks from Minidoka NHS and Wilson Butte Cave.

Table 3.5-3 summarizes the siting corridor acreage, associated total ground disturbance acreage, and approximate proportion of relative physical impact potential within the siting corridors for the action alternatives. Cultural resource counts per siting corridor and estimated counts for cultural resources in the project ground disturbance area are included for each action alternative, as is siting corridor area overlap with Minidoka WRC. Siting corridors would not overlap Minidoka NHS under any action alternative.

Table 3.5-3. Acreage of Project Disturbance and Cultural Resource Counts in the Siting Corridors, Comparatively, in the Physical Area of Potential Effects by Action Alternative

Component or Metric	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Siting corridors	84,051 acres/ 131 square miles	65,215 acres/ 102 square miles (22% less than Alternative B)	48,597 acres/ 76 square miles (42% less than Alternative B)	50,680 acres/ 79 square miles (40% less than Alternative B)	44,768 acres/ 70 square miles (47% less than Alternative B)
Total ground disturbance	9,114 acres/ 14 square miles	6,953 acres/ 11 square miles (24% less than Alternative B)	4,838 acres/ 8 square miles (47% less than Alternative B)	5,136 acres/ 8 square miles (44% less than Alternative B)	4,492 acres/ 7 square miles (51% less than Alternative B)
Siting corridor overlap with Minidoka WRC	4,449 acres/ 7 square miles	690 acres/ 1 square mile (84% less than Alternative B)	1,759 acres/ 3 square miles (60% less than Alternative B)	165 acres/ 0.3 square mile (96% less than Alternative B)	0 acres/ 0 square miles (100% less than Alternative B)
Previously recorded cultural resources in physical APE	243 sites (91 eligible, 20 unevaluated, 132 not eligible)	196 sites (72 eligible, 19 unevaluated, 105 not eligible)	161 sites (58 eligible, 12 unevaluated, 91 not eligible)	154 sites (55 eligible, 15 unevaluated, 84 not eligible)	147 sites (56 eligible, 13 unevaluated, 78 not eligible)
Estimated cultural resources in the project ground disturbance acres	43 sites	33 sites (24% less than Alternative B)	23 sites (47% less than Alternative B)	24 sites (44% less than Alternative B)	21 sites (51% less than Alternative B)

As discussed in Chapter 2, Section 2.3, action alternatives have been developed with the intent to avoid and minimize potential impacts to Wilson Butte Cave, Minidoka NHS, and the communities that have connections to these places, as well as accounting for other resources concerns (see Figure 2.4-1 for a comparison of alternatives). Alternative B siting corridors would overlap 4,449 acres (7 square miles) of Minidoka WRC, which would result in a greater potential for physical impacts to cultural resources within and associated with Minidoka WRC than Alternative C, D, or E. Reducing siting corridors would also reduce potential impacts to the ability of former incarcerees, their descendants, Minidoka-connected communities, and the general public to experience Minidoka NHS. Reducing ground disturbance acreage would reduce disturbance of Tribal treaty areas and resources within siting corridors.

Alternatives C through E and the Preferred Alternative have reduced amounts of siting corridors compared to Alternative B, and therefore the trend is toward decreased associated physical effects. Compared to Alternative B, Alternative C incorporates reduced western corridors, Alternative D incorporates reduced centralized corridors, and Alternative E incorporates reduced southern corridors. The Preferred Alternative combines elements from Alternatives C and E to further reduce siting corridors, including those closer to Minidoka NHS, and proposes a shorter maximum turbine height than other action alternatives. Impacts to cultural resources under Alternatives C through E and the Preferred Alternative are addressed and compared to Alternative B and to one another.

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (Table 3.5-4; see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize physical impacts to cultural resources under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for physical impacts to cultural resources are summarized in Table 3.5-4 and detailed in Table App 4-4 in EIS Appendix 4.

Table 3.5-4. Mitigation for Physical Impacts to Cultural Resources

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1–4	D	a
6–7	E	e
14	H	g–k
17	J	qq–ss
31	–	hhh
33	–	jjj
37–38	–	zzz
43–44	–	–
49	–	–
66	–	–
75	–	–
82	–	–
85–88	–	–
90	–	–
92	–	–
97	–	–
99	–	–
113	–	–
116	–	–
118–120	–	–
123	–	–
129–130	–	–
132	–	–
135–136	–	–

Note: All measures are detailed in EIS Appendix 4.

Measures a, z, ss, hhh, and jjj would further minimize the amount of ground disturbance within the physical APE, and measures a, e, and g through k would further minimize potential fugitive dust, thus reducing the potential for physical impacts to cultural resources. Measures qq, rr, and zzz would further minimize or mitigate detrimental physical impacts to cultural resources, if not avoided.

3.5.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would include 24% less total ground disturbance than Alternative B (see Table 3.5-3), decreasing the potential for physically impacting cultural resources in siting corridors by having an overall smaller construction footprint. Alternative C siting corridors would overlap 690 acres (1 square mile) of Minidoka WRC (see Figure 2.4-1), which would result in less potential for physical impacts to cultural resources within and associated with Minidoka WRC than Alternative B or Alternative D but more potential for impacts than Alternative E. Reduction of ground disturbance acreage under Alternative C would reduce disturbance of Tribal treaty areas and resources within siting corridors as compared to Alternative B. The applicant-committed measures, required mitigation, and additional measures under Alternative C would be the same as Alternative B and the other action alternatives.

3.5.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would include 47% less total ground disturbance than Alternative B (see Table 3.5-3), and 30% less than Alternative C. Under Alternative D, siting corridors would overlap 1,759 acres (3 square miles) of Minidoka WRC (see Figure 2.4-1), which would result in less potential for physical impacts within Minidoka WRC than Alternative B but more potential for physical impacts within Minidoka WRC than Alternative C, Alternative E, and the Preferred Alternative. Reduction of ground disturbance acreage under Alternative D would reduce disturbance of Tribal treaty areas and resources within siting corridors as compared to Alternatives B and C. The applicant-committed measures, required mitigation, and additional measures under Alternative D would be the same as the other action alternatives.

3.5.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would include less total ground disturbance than Alternatives B (44% less) and C (26% less) but marginally more (6% greater) disturbance than Alternative D (see Table 3.5-3). The comparably less ground disturbance of Alternatives D and E would decrease the potential for physically impacting cultural resources in their siting corridors. Alternative E corridor locations have a lower density of known cultural resources than Alternative B, C, or D, which could be attributable to less previous survey in the Alternative E areas for documenting cultural resources. Alternative E siting corridors would only overlap 165 acres (0.3 square mile) of Minidoka WRC (see Figure 2.4-1), which would result in greater opportunities to avoid physical impacts to cultural resources within Minidoka WRC than Alternative B, C, or D. Reduction of ground disturbance acreage under Alternative E would reduce disturbance of Tribal treaty areas and resources within siting corridors as compared to Alternatives B and C, but ground disturbance would remain slightly more under Alternative E than Alternative D. The applicant-committed measures, required mitigation, and additional measures under Alternative E would be the same as the other action alternatives.

3.5.4.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would include less total ground disturbance than any other action alternative (51% less than Alternative B, 35% less than Alternative C, 7% less than Alternative D, and 13% less than Alternative E; see Table 3.5-3). Unlike other action alternatives, physical impacts within Minidoka WRC under the Preferred Alternative would be absent, siting no turbines, access roads, or other ancillary facilities in the Minidoka WRC (see Figures 2.4-1 and 3.5-1). Reduction of ground disturbance acreage under the Preferred Alternative would reduce disturbance of Tribal treaty areas and resources within siting corridors as compared to Alternatives B–E. The Preferred Alternative is found to have the least overall potential for physical impacts to cultural resources. The applicant-committed measures, required mitigation, and additional measures under Alternative E would be the same as the other action alternatives.

3.5.4.2.7 CUMULATIVE IMPACTS

As noted in Section 3.5.4.1 (Affected Environment), some of the existing and future actions identified have occurred or would occur in the physical APE; therefore, cumulative physical effects to cultural resources would result from the project when added to those actions. These existing and future actions include agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. The physical effects of the project would be additive to the physical effects of existing and future actions where they occur on the same cultural resources. The existing and future actions, particularly grazing and agricultural land use, tend to encompass most cultural resources in the physical APE, and where the project does not avoid these cultural resources, cumulative effects would result.

As noted in Section 3.5.4.1 (Affected Environment), 243 previously recorded cultural resources are within the physical APE and subject to physical impacts if not avoided by the project. The addition of ground-disturbing activities from Alternative B to the existing and other planned future ground-disturbing actions in the physical APE would potentially result in cumulative physical impacts to approximately 43 cultural resources. All alternatives that substantially lessen the overall amount of ground disturbance also lessen the potential for cumulative physical impacts to cultural resources from the project, including Tribal resources described under Treaties. Alternative D and Alternative E would not have substantially different levels of ground disturbance within their siting corridors, but both would have substantially less than Alternative C, which would have substantially less then Alternative B. The Preferred Alternative, with the least amount of ground disturbance area of the action alternatives, would have correspondingly the least potential for physical impacts to cultural resources of all actional alternatives. Previously recorded cultural resources within the associated siting corridors for these action alternatives largely correspond with their reduced overall footprint, as described in impact analyses for each action alternative. The number of cultural resources projected within the disturbance areas for the siting corridors of each action alternative decreases consistently from Alternative B to Alternative C and to Alternatives D and E, and finally the Preferred Alternative. Alternative D, Alternative E, and the Preferred Alternative are not estimated to have substantially different cultural resource numbers proportionated to their disturbance acreages.

3.5.4.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Cultural resources within the siting corridors or range improvement areas, where physical impacts could occur, could be exposed to physical impacts from ground-disturbing project activities throughout the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. An irreversible effect on cultural resources could occur under all action alternatives where the project does not avoid physical impacts to cultural resources.

3.5.4.4 Compensatory Mitigation

In addition to the implementation of applicant-committed measures and other mitigation (see EIS Appendix 4), additional measures to avoid, minimize, or mitigate physical impacts to cultural resources would be developed and implemented under the HPMP and HPTPs as part of the project's PA (see EIS Appendix 8). Should the BLM require the burying of collector lines in functional greater sage-grouse habitat as mitigation (see Table App4-5 in EIS Appendix 4), this additional ground disturbance within the siting corridors would slightly increase the potential for cultural resource impacts under any action alternative. Where physical impacts to cultural resources result, any adverse effects as determined under NHPA Section 106 would be resolved through treatment measures specified under the HPMP and HPTPs as part of the PA (see EIS Appendix 8).

3.5.5 Non-physical Impacts

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.5-5.

Table 3.5-5. Analysis Approach for Non-physical Impacts to Cultural Resources

Issue Analyzed in Detail	Issue 2: How would the installation of new aboveground infrastructure cause non-physical impacts to cultural resources (i.e., with visual or auditory effects)?
Analysis Area	The analysis area for this issue is the non-physical APE, as described in Table 3.5-1 and shown on Figure 3.5-2. The non-physical APE is where aspects of cultural resources could be affected by visual or similar (i.e., audible) off-site non-physical impacts from the project. Non-physical impacts from the project that would occur off-site of the resource could affect aspects of cultural resources such as setting, feeling, and association that may also result in the disturbance of the existing solitude and appearance of the resource's surroundings. Non-physical impacts could also affect culturally important wildlife, vegetation, or waters in a manner that diminishes treaty rights or changes subsistence practices and cultural relationships to the wildlife and their habitats. See Section 3.18 (Wildlife) as well as Sections 3.15 (Vegetation), 3.17 (Water and Wetland Resources), and 3.18 (Wildlife) in EIS Appendix 15 for how these resource patterns or availability would be changed by the project.
Indicators	Number of known and estimated cultural resources within the non-physical APE and the number of these cultural resources that are potentially susceptible to non-physical impacts from the project The impact indicator will be evaluated in accordance with the NHPA and NEPA regulations and guidance, inclusive of other laws and policies with which these coordinate (i.e., AIRFA, ARPA, and EOs).
Impacts Duration	The impacts duration for non-physical visual impacts from vertical project infrastructure would be the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. The impacts duration for non-physical audible impacts (from turbines and transmission lines) would be the 30-year operation phase.
Data Sources	Data sources evaluated for non-physical impacts to cultural resources are the same as for physical impacts, with the exception of Power (2022), which is primarily applicable to the non-physical APE; SWCA (2022); and SWCA (2023).
Assumptions or Approach	The non-physical impacts analysis considers potential impacts to the 4,731 previously recorded cultural resources within the non-physical APE, consisting of 356 cultural resources from Power (2021) (including 10 cultural resources also from SWCA [2023]), 4,328 cultural resources from Power (2022), and 47 cultural resources from SWCA (2023). These cultural resources are listed in Appendix 6 of EIS Appendix 8. Because of changes to the Proposed Action since 2020, the additional 774 cultural resources presented in Appendix 6 of EIS Appendix 8 in both Power (2021) and Power (2022) are outside the non-physical APE for the project and are not further included in EIS analyses. The methods used in Power (2022) for identifying cultural resources potentially susceptible to non-physical effects were adapted and applied for all cultural resources. Cultural resources considered potentially susceptible to non-physical (visual and auditory) impacts, pending confirmation of integrity of setting, feeling, and association, include the following: • Sites that are eligible for or listed on the NRHP under Criterion A or C or that contribute to a district eligible under these criteria • Sites that remain unevaluated but contain aboveground features (i.e., standing structures) and that may be eligible under Criterion A or C • Sites that are eligible under Criterion D, or not eligible or unevaluated, but that contain aboveground features (i.e., petroglyph/pictograph sites, caves, rockshelters, stone circles, cairns, and other rock alignments), and that may be considered sites of potential religious and traditional cultural significance to Tribes—some of which could be deemed to be a possible TCP, and/or contribute to a potential district or cultural landscape • Minidoka WRC and sites with ties to it Cultural resources that are eligible only for their data potential (i.e., Criterion D) without such aboveground features or ties (that would make them eligible for the NRHP under Criterion A, B, or C), would not be considered susceptible to non-physical impacts and would not be subject to further analysis for visual or auditory effects.

3.5.5.1 Affected Environment

In all, 4,731 cultural resources have been previously recorded during surveys that have covered approximately 7% of the approximately 1,809,080-acre (2,827-square-mile) non-physical APE (Power 2021, 2022; SWCA 2023). Of these resources, 1,787 (comprising 484 historic properties, 790 sites contributing to a historic district, 506 unevaluated sites, and seven non-eligible sites) are cultural resources where integrity of setting, feeling, or association would be integral to their NRHP eligibility or would be part of their potential traditional and religious cultural significance to Tribes, and, therefore, these cultural resources would be susceptible to potential adverse non-physical impacts. These resources encompass a wide range of site types, including the same range of site types found within the physical APE, as detailed in Power (2021, 2022) and in Section 3.5.5.1. These site types range from precontact and historic petroglyph/pictograph sites to sites that are part of 12 historic districts[18]; see Appendix 6 of EIS Appendix 8 for a comprehensive list of resources. Also within the non-physical APE, the Lava Rock Structures Thematic Group consists of multiple basalt masonry buildings and structures, including residences, outbuildings, farm buildings, commercial buildings, institutional buildings, dams, and canal banks, with a period of significance from 1875 to 1941 (Power 2022).

Within the non-physical APE, the range of cultural resources includes aboveground historic buildings and structures, including many located within these historic districts within towns and settlements; linear transportation routes, including railroads and trails (e.g., the Oregon Shortline Railroad, UPRR, U.S. highways, Starr's Ferry Wagon Road, and Oregon Trail); irrigation-related resources; and transmission lines. Prehistoric resources include petroglyph/pictograph sites. Although no designated TCPs have been previously recorded within the non-physical APE (Power 2021, 2022), data sources indicate that of the 1,787 cultural resources susceptible to non-physical impacts, 73 contain feature types of potential traditional or religious cultural significance to Native Americans. The Oregon Trail and Minidoka NHS, present within the non-physical APE, are administered by the NPS and are resources of national significance (see Figures 3.5-1 and 3.5-2).

The non-physical impacts could also affect culturally important wildlife, vegetation, or waters in a manner that diminishes treaty rights or changes subsistence practices and cultural relationships to the wildlife and their habitats. See Section 3.18 (Wildlife) as well as Sections 3.15 (Vegetation), 3.17 (Water and Wetland Resources), and 3.18 (Wildlife) in EIS Appendix 15 for how these resource patterns or availability would be changed by the project.

Parties participating in the initial project scoping and Section 106 consultation processes additionally commented regarding several cultural resources of potential concern within the non-physical APE. These resources include the following:

- Post-contact buildings and structures (e.g., historic farms, ranches, schools, roads and railroads, bridges, and similar elements of the built environment)
- Petroglyph/pictograph sites
- Minidoka NHS and Minidoka WRC
- Oregon Trail and associated historic sites and other historic wagon roads
- Devil's Corral

[18] Named historic districts in the APE are as follows: Bonneville Power Administration (BPA) Unity Substation Historic District, BPA Heyburn Substation Historic District, Minidoka Gravity Division Historic District, North Side Pumping Division Historic District, Shoshone Historic District, Shoshone Historic District Boundary Increase, Rupert Town Square Historic District, Rupert Town Square Historic District Boundary Increase, Twin Falls Downtown Historic District, Twin Falls Original Townsite Historic District, Twin Falls City Park Historic District, and Twin Falls Historic Warehouse District.

- Sites of traditional or religious cultural significance to Tribes (e.g., Wilson Butte Cave, other caves and buttes, and cultural landscapes)

These resources are addressed within the analysis of non-physical impacts to cultural resources where determined to be within the APE. Since consultation on cultural resources remains ongoing under Section 106, this list may not be comprehensive within this EIS.

Approximately 7% of the non-physical APE has received previous survey, resulting in documentation of 4,731 cultural resources (Power 2021, 2022; SWCA 2023). Projecting cultural resource site density proportionately across both previously surveyed and unsurveyed areas within the non-physical APE (equating to approximately 11 cultural resource sites per square mile), approximately 31,094 total cultural resources could exist within the non-physical APE. This projected quantity of cultural resources provides the maximum-case scenario where cultural resource distribution would be equal across the area.

There are 1,787 previously recorded cultural resources that could be susceptible to non-physical impacts from the installation of new aboveground project infrastructure within the turbine and 500-kV transmission line siting corridors if not avoided by project design or through the application of other protection measures or mitigation (see Appendix 6 of EIS Appendix 8). Based on the average percentage of previously recorded susceptible cultural resources across the area of all action alternatives (41% of all previously identified cultural resources), approximately 12,748 susceptible cultural resources could occur in the non-physical APE for the 2,420 square miles of Alternative B, at the estimated 11 cultural resources per square mile for the non-physical APE. However, cultural resources distribution for susceptible sites is clustered in urban or town locations that are not representative of the undeveloped landscapes that make up most of the non-physical APE. Most of susceptible cultural resources in the non-physical APE would be toward the more developed areas, which are in the middleground (10–20 miles from turbines). At middleground distances, the project would not dominate views from these resources (see Section 3.16.1.2 [Impacts, Visual Resources] regarding visual prominence reducing with distance). These distances are well outside the up-to-2.2-mile perceptible operational noise zone.

3.5.5.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have likely impacted or would impact cultural resources in and near the non-physical APE. These impacts would non-physically alter the characteristics of cultural resources that contribute to their NRHP eligibility or traditional and religious cultural significance to Tribes as a result of visual, auditory, or atmospheric intrusions on these resources. This would include impacts to aspects of feeling, setting, and association of Minidoka NHS to Japanese Americans and Minidoka-connected communities. Existing and future trends and actions potentially producing these non-physical impacts include agricultural land use, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects.

Existing and future trends and actions on federal lands, under federal funding, or under federal permitting would be subject to cultural resources identification and assessment of effects to cultural resources in compliance with ARPA and NHPA Section 106, at minimum. These cultural resources identification and assessment efforts also assist in informing Government-to-Government consultation with federally recognized Tribes, in accordance with EO 13175 and 36 CFR 800. These efforts are of further assistance in finding cultural resources on federal lands of significance to Tribes to which NAGPRA or AIRFA and EO 13007 may apply. JSO 3403 and ACHP et al. (2021) would also be applied by the DOI in regard to Tribal treaty rights. Based on the results of those cultural resources identification and assessment efforts and Tribal consultation, the lead federal agency would require the avoidance, minimization, and mitigation of adverse effects to these resources under NHPA Section 106. Where federal permitting and law do not apply (e.g., on state or private lands), cultural resources identification efforts might not occur, and impacts might go unassessed and unmitigated.

As described in Section 3.1.1 (Existing and Future Trends and Actions), future development in the non-physical APE beyond the area of the immediate project is likely to include improvements to U.S. 93 between I-84 and ID 25, improvements to the I-84/ID 50 interchange, construction of the SWIP-North transmission line, and construction of the Gateway West transmission line. The 1,500-MW Taurus Wind Project is proposed on land west of the siting corridors and is situated within the non-physical APE, south-southwest of the town of Shoshone. Future transmission line structures and turbine towers planned in the non-physical APE would result in the development of up to approximately 1,500 MW of wind energy generation in 58,703 acres of the Taurus Wind Project boundary, 1,500 MW of solar energy generation, 36.98 added miles of transmission structures spaced intermittently along the SWIP-North transmission line, and 53.10 added miles along the Gateway West transmission line (see Figures 3.1-1 and 3.5-2).

3.5.5.2 Impacts

3.5.5.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and cultural resources and the Tribes’ access to resources described under Treaties would only be non-physically impacted by existing and future trends and actions. Where existing and future trends and actions occur on federal lands or under federal funding or permitting, impacts to cultural resources would be resolved in accordance with federal law. Off federal land, without federal funding, and without federal permitting, trends and actions have likely impacted or would impact cultural resources, and these impacts are likely to go unmitigated.

3.5.5.2.2 ALTERNATIVE B (PROPOSED ACTION)

Under Alternative B, non-physical impacts to cultural resources, including Tribal resources described under Treaties, would result from the installation of new aboveground infrastructure within the turbine and the 500-kV transmission line siting corridors. The resulting non-physical impacts on cultural resources would include visual impacts to those cultural resources where setting, feeling, or association are important site characteristics. For a subset of these resources, these characteristics contribute to the resource’s eligibility for the NRHP (see Appendix 6 of EIS Appendix 8). Transmission structures, turbine towers, and turbine blades would represent the most prominent sources of potential visual impacts on cultural resources in the larger non-physical APE. Visual impacts would include the daytime visibility of any project structure and the nighttime visibility of project warning lights, such as aviation warning lights on turbines.

Figures App5-1 and App5-2 in EIS Appendix 5 (Select Visual Resources Simulations) provide simulated condition comparisons of 3-MW and 6-MW turbines at varying distances from the viewer (at KOP 5 [Idaho Highway 24]) and with the blades oriented vertically as well as offset from vertical. These figures serve as visual comparison aids showing the scale at which the turbines would appear at varying distances on the landscape, within a flat, open view with low-lying vegetation and no existing vertical landscape features. The degree of visual prominence is lessened with distance. The nearest turbine siting corridor would be 1.7 miles from the Minidoka NHS Visitor Center (KOP 1; Figure 3.5-4), 1.7 miles from the Minidoka NHS Honor Roll (KOP 16), 0.9 mile from Wilson Butte Cave (KOP 10), and 1.4 miles from Sid Butte (KOP 17). Construction and decommissioning light sources would be temporary and would include portable lighting plants and lights on construction office structures. During operation, the overhead sky brightness after project completion (such as seen from Minidoka NHS), is anticipated to remain at a similar level to the current condition of scattered light from nearby towns. However, the greatest impact would occur near the horizon (at 3 degrees elevation); here, night sky brightness would increase by 45% to 100% for an estimated 2% to 8% of the time when project ADLS would be activated[19] due to nearby aircraft. Comparatively, when ADLS would be inactive (92% to 98% of the time), night sky brightness would increase between 0.5% and 2.2% as a result of the project, and this change in night sky brightness would not be perceptible to human viewers. If aircraft are not near the project, the ADLS would ensure the turbines are not lit (system inactive). When aircraft are near the project (system active), all turbines would be lit as described in Section 3.16.2.2 (Impacts, Visual Resources) (Capitol Airspace Group 2022; Dark Sky Partners 2022).

For auditory impacts, the acoustic environment at Minidoka NHS was modeled at 32 dBA, or 6.0 dBA above the natural ambient sound level (NPS 2015). However, because Minidoka NHS and Minidoka WRC are considered sensitive noise receptors, the noise impact assessment performed for the project conservatively assumed existing background noise levels for NSAs within and near Minidoka NHS and Minidoka WRC to be 19.3 dBA (L_{eq})[20] or 27.9 dBA (L_{dn}), which is considered very quiet and comparable to the sound of rustling leaves or a soft whisper (SWCA 2022). The results of SWCA (2022) indicate that operational noise levels near Minidoka NHS would range from 4.6 to 12.5 dBA above existing background levels and would range from 4.0 to 16.2 dBA above existing background levels within Minidoka WRC. As noted in Section 3.6.1.2.2, although these operational noise levels are all below the EPA's recommended noise standard of 55 dBA for residential land uses, the increased noise levels above existing conditions could be perceptible from Minidoka NHS and from within portions of Minidoka WRC up to 2.2 miles from turbines and transmission lines. Although these are two different studies, SWCA (2022) modeled noise levels would exceed the existing noise levels modeled by NPS (2015) for Minidoka NHS by approximately 0.5 to 8.5 dBA at two of the NSAs within or near Minidoka NHS. Because of the importance of the existing soundscape to the environmental setting and overall visitor experience of remoteness, isolation, abandonment, reflection, and healing, such an increase in sound as experienced over 30 years would result in an adverse non-physical (audible) impact to the current setting and feeling of Minidoka NHS. Audible impacts would result within up to 2.2 miles from the turbine corridors and 0.5 mile from the 500-kV transmission line siting corridors and reach 26,357 acres (41 square miles) of Minidoka WRC (with potential impacts within 77% of the overall approximately 34,000-acre boundary; see Figure 3.5-2). These audible impacts would extend to the entire 388 acres (0.6 square mile) of Minidoka NHS. As stated at Section 3.5.1 (Native American Resources), Wilson Butte and Wilson Butte Cave, Sid Butte, and other buttes and cultural resources of potential concern to Tribes are also within the operational noise zone for the project.

MVE's applicant-committed measures, required mitigation, and additional measures (see Table 3.5-8; see Table App4-2 in EIS Appendix 4) would be implemented, supporting the avoidance and minimization of non-physical impacts to cultural resources. However, all cultural resources may not require avoidance or minimization of non-physical impacts. Typically, archaeological resources that do not have further research value and are not ascribed Tribal significance, and aboveground buildings or structures that are not important due to their historic design or connection to events in history, would not require avoidance, unless additionally protected under AIRFA, NAGPRA, ARPA, or other similar laws, treaty rights, and policies described in this EIS. Ultimately, it is anticipated that not all non-physical impacts to cultural resources can be avoided or can be minimized to a degree resulting in no adverse effect under either NEPA or NHPA Section 106. MVE's applicant-committed measures (see EIS Appendix 4) 3, 4, 6, 17, 18–25, 29, 33, 37, 43, 49, 89, 90, 95–97, 113–116, 118, 119, 131, 132, 162, 163, and 164, when implemented, would reduce potential non-physical impacts to cultural resources in the analysis area. EIS

[19] Pending FAA approval of the ADLS systems for this wind facility.

[20] Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.

Appendix 4 further provides measures that would avoid, minimize, or mitigate impacts to wildlife, vegetation, and waters, including of Tribal concern, such as measures 9, 11–13, 15, 109, 112, 122, 137–144, 147, 148, 150–152, and 155–160 in Table App4-2. The BLM would further require mitigation measures D, H, J, and P applicable to cultural resources (see EIS Appendix 4). Mitigation required under BLM policy further provides measures that would avoid, minimize, or mitigate impacts to wildlife, vegetation, and waters, including of Tribal concern or Treaty Right, throughout Table App4-3 in EIS Appendix 4 (measures A–FF). Additional mitigation measures applicable to wildlife, vegetation, or water concerns that Tribes may have include measures a–m, o–u, w–uu, bbb–fff, hhh, kkk, nnn–qqq, www–ffff, and llll in Table App4-4 in EIS Appendix 4. Other measures for avoidance, minimization, and mitigation for resolving adverse effects to historic properties are addressed in the PA (see EIS Appendix 8 and Section 3.5.3) and would be included in the HPMP, the HPTPs, and monitoring and discovery plan tiering to the PA.

Based on a review of existing cultural resources data, including any Tribal and applicable ethnographic information received throughout the consultation process (e.g., Far Western Anthropological Research Group, Inc. 2022), the analysis of potential impacts to cultural resources addresses all known cultural resources within the non-physical APE. Susceptible cultural resources—i.e., where setting, feeling, or association are important aspects of the cultural resources that would be affected by the project—that are identifiable within the non-physical APE would be inventoried and assessed for non-physical impacts pursuant to the PA (see EIS Appendix 8). A historic properties visual effect assessment will be conducted by MVE in support of this inventory and will include VCR analysis, meeting BLM and SHPO requirements, to assess potential non-physical (visual) effects on cultural resources within the non-physical APE.

For those project effects to cultural resources, including resources of traditional and religious cultural significance to Tribes or TCPs, that the BLM determines to be adverse under the NHPA Section 106 process (as contemplated through the PA), the BLM would consult with consulting parties to identify avoidance, minimization, and mitigation strategies for such adverse effects in accordance with the regulations at 36 CFR 800 and per the PA. The PA is being developed in accordance with Section 106 of the NHPA (36 CFR 800.14) to address the further identification of NRHP-eligible cultural resources in the APE, ensure consideration of effects on all known NRHP-eligible cultural resources, and direct the treatment of NRHP-eligible cultural resources to a resolution of adverse effects (see the Consultation and Coordination section in EIS Appendix 10 and EIS Appendix 8). AIRFA protections and EO 13007 guidance for Native American sites of religious importance and Tribal resources described under Treaties would be addressed through Government-to-Government consultation between the BLM and federally recognized Tribes.

There are 1,787 previously recorded cultural resources and 12,748 estimated cultural resources potentially susceptible to visual impacts in the non-physical APE.[21] These resources include the nationally significant Minidoka NHS and Oregon Trail (seven field-verified Oregon Trail segments are within the project viewshed in the non-physical APE for Alternative B; see Figure 3.5-2). A total of 50 of these previously recorded cultural resources would be potentially susceptible to auditory effects within the up-to-2.2-mile operational noise zone. Since an average of eight cultural resources are estimated per square mile within the auditory component of the non-physical APE, approximately 3,606 cultural resources could occur in the auditory component of the non-physical APE, of which 361 could be susceptible to auditory impacts. As noted in Section 3.5.5.1 (Affected Environment), most of the cultural resources would be located toward the more developed areas, which are in the middleground (10–20 miles from turbines). Located in

[21] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

the middleground, the project would not dominate views from these resources. At these distances, these resources are beyond the up-to-2.2-mile perceptible operational noise zone and project-related auditory impacts would not occur. The estimated site counts present the worst-case scenario and provide a quantitative basis for comparing potential visual and auditory non-physical impacts proportionally across the action alternatives. Further identification of those cultural resources susceptible to visual and auditory non-physical impacts, and assessment of corresponding effects for these resources, would proceed pursuant to the PA (see EIS Appendix 8).

Under Alternative B and consistent with the Section 3.16.1.2 (Visual Resources) analysis, known susceptible cultural resources would experience major degrees of visual change in the immediate foreground, such as identified at KOP 1 (Minidoka NHS Visitor Center) and KOP 10 (Wilson Butte Cave). Proposed turbines would dominate the landscape in the immediate foreground of these KOPs, which are located approximately 1.7 miles and 0.9 mile from the project, respectively. The landscape would appear to be severely altered because of the dominance of the wind turbines in scale, color, line, texture, and form, as well as the motion of the turbine blades, which would create major degrees of visual change in the setting. KOP 1 is simulated under two viewing conditions to reflect different times of day (see SWCA [2024] Appendix C). Both morning and evening at this KOP would have major visual changes. The major visual changes that would be experienced at KOPs 1 and 10 correlate to visibility level 6 with strong visual contrast in which the project dominates the field of view and is a major focus of visual attention (Sullivan et al. 2012). In addition to size, contrasts in form, line, color, and texture in addition to the movement of the turbine blades would contribute substantially to drawing viewer attention. The visual prominence of the project would detract noticeably from views of other landscape elements. Impacts to select sensitive viewer groups visiting Minidoka NHS, such as from the Japanese American communities, or Wilson Butte Cave, such as from Native American communities, may have impacts beyond the casual viewer in that they could experience the setting from a visual-cultural perspective disproportionally higher than the typical visitor (see Section 3.6.1.2). From KOP 10 (Wilson Butte Cave), turbines would be visible in the field of view all around (360 degrees) under Alternative B, spanning a maximum distance of up to 24 miles across the eastward horizon, beginning with the nearest turbine siting corridor at 0.9 mile distant. From KOP 1 (Minidoka NHS Visitor Center), turbines would be visible across the full field of human vision (in a 135 degree arc) when focused northeastward, spanning a maximum distance of approximately 24 miles across the horizon, beginning with the turbine siting corridor at 1.7 miles distant.

The project transitions from the foreground to middleground distances at 10 miles. The Oregon Trail, to the south of the project, is a known susceptible cultural resource from which turbine visibility would lessen after the foreground distances change to middleground distances beyond 10 miles. In the middleground (10–20 miles), the project would attract attention but would not dominate views. Turbines would correlate to visibility levels from 4 to 2 (Sullivan et al. 2012) when transitioning from the foreground to the middleground in relation to susceptible cultural resources such as the Oregon Trail near Milner Ruts (KOP 4). The visual change experienced at KOP 4 would correlate to visibility level 4 where the nearest turbine siting corridor is within 9.4 miles and where not obstructed by intervening factors (rolling ridges, trees, humanmade structures, or similar visual barriers). At visibility level 4, visible turbines would be obvious and have sufficient size or contrast to compete with other landscape elements, but they would have insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of the observer’s visual field (Sullivan et al. 2012). Turbines viewed at a distance of 9.4 miles from KOP 4 would appear 90% smaller than turbines viewed at 0.9 mile from KOP 10 (Wilson Butte Cave) and would appear 83% smaller than turbines viewed at a distance of 1.7 miles from KOP 1 (Minidoka NHS Visitor Center). As turbines fade from the foreground into the middleground, the Oregon Trail near Milner Ruts (KOP 4) would experience a minor degree of visual change. The visual change experienced with these middleground distances would correlate to a visibility level of 2 (Sullivan et al. 2012), indicating that the turbines are very small and faint, but when observers scan the horizon or view the area closely, turbines can be detected without extended viewing. Although turbines at visibility level 2 would be noticed sometimes by the casual observer, the general public would not notice visual changes without some active looking (Sullivan et al. 2012). For to-scale simulations and viewing information for visual resources KOPs, including for the BLM's Preferred Alternative from KOPs 1, 2, 10, and 16, please refer to EIS Appendix 5 or the project visual resources technical report (SWCA 2024), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510).

Table 3.5-6 summarizes the non-physical APE acreage and square mileage; associated numbers of 3- and 6-MW turbines; and approximate proportion of non-physical impact potential for Alternatives B through E and the Preferred Alternative (see also Figures 2.4-1 and 3.5-2). Cultural resource counts, including for those potentially susceptible to non-physical visual and/or auditory impacts for each action alternative, are included in the table. Table 3.5-7 provides the number of susceptible cultural resources per visual resources distance zone and by action alternative in the visual component of the non-physical APE.

Table 3.5-6. Project Disturbance and Cultural Resource Counts in the Non-physical Area of Potential Effects by Action Alternative

Component or Metric	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Number of wind turbines	Up to 400 3-MW turbines or up to 349 6-MW turbines	Up to 378 3-MW turbines or up to 259 6-MW turbines	Up to 280 3-MW turbines or up to 179 6-MW turbines	Up to 269 3-MW turbines or up to 194 6-MW turbines	Up to 241 3-MW or 5-MW turbines
Non-physical APE Acreage and Square Mileage					
Visual component of the non-physical APE	1,809,080 acres/2,827 square miles	1,548,576 acres/2,420 square miles (14% less than Alternative B)	1,385,590 acres/2,165 square miles (23% less than Alternative B)	1,465,465 acres/2,290 square miles (19% less than Alternative B)	1,434,984 acres/2,242 square miles (21% less than Alternative B)
Auditory component of the non-physical APE	288,493 acres/451 square miles	205,235 acres/321 square miles (29% less than Alternative B)	152,704 acres/239 square miles (47% less than Alternative B)	174,340 acres/272 square miles (40% less than Alternative B)	160,974 acres/252 square miles (44% less than Alternative B)
Number of Previously Recorded Cultural Resources in the Non-physical APE (and NRHP eligibility status)					
Visual component of the non-physical APE	4,735 total: 914 eligible/or listed 790 contributing to a district 684 unevaluated 2,347 not eligible	3,872 total: 726 eligible/or listed 790 contributing to a district 5,721 unevaluated 1,784 not eligible	3,681 total: 677 eligible/or listed 782 contributing to a district 530 unevaluated 1,692 not eligible	3,746 total: 698 eligible/or listed 789 contributing to a district 549 unevaluated 1,710 not eligible	3,823 total: 727 eligible/or listed 782 contributing to a district 569 unevaluated 1,745 not eligible
Auditory component of the non-physical APE	454 total: 155 eligible/or listed 40 unevaluated 259 not eligible	311 total: 95 eligible/or listed 29 unevaluated 187 not eligible	265 total: 84 eligible/or listed 18 unevaluated 163 not eligible	258 total: 85 eligible/or listed 26 unevaluated 147 not eligible	232 total: 82 eligible/or listed 25 unevaluated 125 not eligible
Number of Previously Recorded Cultural Resources in the APE Susceptible to Non-physical Impacts (and NRHP eligibility status)					
Visual impacts susceptibility	1,787 total 484 eligible/or listed 790 contributing to a district 506 unevaluated 7 not eligible	1,599 total 389 eligible/or listed 790 contributing to a district 413 unevaluated 7 not eligible	1,556 total 375 eligible/or listed 782 contributing to a district 392 unevaluated 7 not eligible	1,560 total 370 eligible/or listed 789 contributing to a district 394 unevaluated 7 not eligible	1,599 total 397 eligible/or listed 782 contributing to a district 413 unevaluated 7 not eligible
Auditory impacts susceptibility	50 total 34 eligible/or listed 9 unevaluated 7 not eligible	35 total 24 eligible/or listed 4 unevaluated 7 not eligible	29 total 21 eligible/or listed 3 unevaluated 5 not eligible	28 total 20 eligible/or listed 4 unevaluated 4 not eligible	27 total 20 eligible/or listed 4 unevaluated 3 not eligible

Component or Metric	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated Number of Susceptible Cultural Resources within the Non-physical APE Projected from Known Sites-Per-Square Mile					
Estimated susceptible cultural resources within the visual component of the non-physical APE	12,748	10,913	9,764	10,327	10,112
Estimated susceptible cultural resources within the auditory component of the non-physical APE	361	257	191	218	201
Overlap of the auditory component of the Non-physical APE with Minidoka NHS (acres/square miles)					
–	388 acres/0.6 square mile	0 acre/0 square mile (100% less than Alternative B)	0 acre/0 square mile (100% less than Alternative B)	0 acre/0 square mile (100% less than Alternative B)	0 acre/0 square mile (100% less than Alternative B)
Overlap of the auditory component of the Non-physical APE with Minidoka WRC (acres/square miles)					
–	26,357 acres/41 square miles	9,102 acres/14 square miles (65% less than Alternative B)	11,441 acres/18 square miles (57% less than Alternative B)	0 acre/0 square mile (100% less than Alternative B)	0 acre/0 square mile (100% less than Alternative B)

Table 3.5-7. Visual Resources Distance Zone and Susceptible Cultural Resource Counts in the Visual Component of the Non-physical Area of Potential Effects by Action Alternative

Visual Resources Distance Zone	Alternative B Susceptible Resources	Alternative C Susceptible Resources	Alternative D Susceptible Resources	Alternative E Susceptible Resources	Preferred Alternative Susceptible Resources
0–2 miles (immediate foreground)	48	39 (19% less than Alternative B)	33 (31% less than Alternative B)	31 (31% less than Alternative B)	31 (31% less than Alternative B)
2–10 miles (foreground)	428	267 (38% less than Alternative B)	261 (39% less than Alternative B)	236 (45% less than Alternative B)	283 (34% less than Alternative B)
10–20 miles (middleground)	1,311	1,293 (1% less than Alternative B)	1,262 (4% less than Alternative B)	1,290 (2% less than Alternative B)	1,282 (2% less than Alternative B)

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (Table 3.5-8; see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize non-physical impacts to cultural resources under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for non-physical impacts to cultural resources are summarized in Table 3.5-8 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.5-8. Mitigation for Non-physical Impacts to Cultural Resources

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
3–4	A–FF	a–m
6	–	o–u
9	–	w–uu
11–13	–	bbb–fff
15	–	hhh
17–25	–	kkk
29	–	nnn–rrr
33	–	ttt
37	–	www–ffff
43	–	llll
49	–	qqqq–hhhh
89–90	–	–
95–97	–	–
109	–	–
112–116	–	–
118–119	–	–
122	–	–
131–132	–	–
137–144	–	–
147–148	–	–
150–152	–	–
155–160	–	–
162–164		

Note: All measures are detailed in EIS Appendix 4.

Measures a, k, r, qqq, rrr, sss, ttt, qqqq, and hhhh would further minimize the degree of visual change observed from cultural resources susceptible to visual impacts. Measures a and qqqq would further minimize the potential for non-physical auditory impacts. Measures qq and rr would further avoid, or minimize or mitigate, detrimental non-physical impacts to cultural resources.

3.5.5.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

As indicated in Table 3.5-6, Alternative C would include fewer turbines than Alternative B and would therefore have less of an impact to cultural resources susceptible to visual impacts than Alternative B. The nearest turbine would be 5.5 miles from the Minidoka NHS Visitor Center (KOP 1), 6.2 miles from Minidoka NHS Honor Roll (KOP 16), 2.5 mile from Wilson Butte Cave (KOP 10), 1.4 miles from Sid Butte (KOP 17), and 10.8 miles from the Oregon Trail routes near Milner Ruts (KOP 4). The visual component of the non-physical APE for Alternative C includes 11% fewer previously recorded cultural resources potentially susceptible to visual impacts than Alternative B, that is, 1,599 compared to the 1,787 resources potentially susceptible from Alternative B. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. Since an average of 11 cultural resources are estimated per square mile within the visual component of the non-physical APE, approximately 26,616 cultural resources could occur in the visual component of the Alternative C non-physical APE. Of these, 10,913 could be susceptible to visual impacts.[22] This would result in 14% fewer estimated susceptible cultural resources than in the visual component of the non-physical APE for Alternative B, which had approximately 12,748 potentially susceptible cultural resources.

Consistent with the Section 3.16.1.2 (Visual Resources) analysis, under Alternative C, foreground viewers along the western edge of the project would have a reduced degree of visual changes due to fewer turbines there. Reduction in the number of turbines under Alternative C would reduce changes in Tribal Treaty areas that could affect resource patterns or availability as compared to Alternative B. Alternative C would have fewer susceptible cultural resources across each of the visual resources distance zones (immediate foreground, foreground, and middleground) as compared to Alternative B (see Table 3.5-7). Visual impacts as seen from susceptible cultural resources, such as Minidoka NHS, Minidoka WRC, and the NRHP-listed Wilson Butte Cave, would specifically be reduced compared to Alternative B. Under Alternative C, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) would be reduced compared to Alternative B, but would remain major and in the foreground. Turbines would be visible in a smaller portion of the field of vision (in a 70 degree arc) focused to the northeast of KOP 1 and spanning a smaller 10-mile portion of the horizon (where not blocked from view by intervening topography, vegetation, and structures). This visual impact reduction includes a shorter construction timeline, fewer turbine corridors compared to Alternative B, fewer total turbines than Alternative B, and an increased visual distance for viewers west of the project. At KOP 1, as distances to the nearest turbine siting corridor based on viewer orientation increase from 1.7 miles under Alternative B to 5.5 miles under Alternative C, the nearest potential turbine would appear 70% smaller in size under Alternative C compared to Alternative B. Visual impacts near Wilson Butte Cave (KOP 10) would also be reduced relative to Alternative B, but would remain major and in the foreground. At KOP 10, turbines under Alternative C would be focused eastward only within a 95 degree arc and across up to 14 miles of the horizon, which would engross just over three-quarters of the human field of vision only if centered in view. At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternative C, the nearest potential turbine would appear 60% smaller in size under Alternative C compared to Alternative B. Visual impacts at the Oregon Trail near Milner Ruts (KOP 4) would also about the same as Alternative B, minor and situated in the middleground. At KOP 4, turbines under Alternative C would be similarly focused northward but concentrated within only a 32 degree arc and spanning up to 16 miles of the horizon, approximately half the field of view and two-thirds the horizon line that Alternative B would occupy. At KOP 4, as distances to the nearest turbine siting corridor increase from 9.4 mile under Alternative B to 10.8 miles under Alternative C, the nearest

[22] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

potential turbine would appear imperceptibly smaller in size under Alternative C compared to Alternative B, particularly when massed with other project turbines.

Cultural resources susceptible to non-physical impacts would primarily be historic buildings and structures, historic transportation corridors, and TCPs or other Tribal resources, and would be consistent with site types introduced in Section 3.5.5.1 (Affected Environment). In particular, under Alternative C, foreground views from cultural resources to the western edge of the project would have a reduced degree of visual changes due to fewer turbines. As a result, visual impacts to Minidoka NHS, Wilson Butte Cave, the Oregon Trail, the Oregon Shortline Railroad, and other susceptible cultural resources to the south, west, and north would specifically be reduced compared to Alternative B. Visual impacts to susceptible cultural resources to the north would be slightly reduced under Alternative C as compared to Alternative B, with the elimination of turbine locations on the north side of ID 24 under Alternative C. Additional details regarding potential visual impacts are provided in Section 3.16.1.2 (Visual Resources). The measures described above in the Alternative B with Additional Measures section would be included in Alternative C and the other action alternatives, reducing the potential for visual impacts to cultural resources.

The auditory component of the non-physical APE for Alternative C includes 30% fewer previously recorded cultural resources potentially susceptible to auditory impacts than Alternative B, 35 compared to the 50 resources potentially susceptible from Alternative B. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. Since an average of eight cultural resources are estimated per square mile within the auditory component of the non-physical APE, approximately 2,565 cultural resources could occur within the auditory component of the non-physical APE for Alternative C. Of these, 257 could be susceptible to auditory impacts. This would result in 29% fewer estimated susceptible cultural resources than the estimated 361 potentially susceptible cultural resources in the auditory component of the non-physical APE for Alternative B. Audible impacts would result within up to 2.2 miles from the turbine corridors and 0.5 mile from the 500-kV transmission line siting corridor. These impacts would reach up to 9,102 acres (14 square miles) of Minidoka WRC (with potential impacts within 26% of the overall approximately 34,000-acre boundary; see Figure 3.19-11). The auditory component for Alternative C would reach 65% less than the 41 square miles reached for Alternative B. Whereas the auditory component of the non-physical APE would reach the entire Minidoka NHS under Alternative B, no auditory impacts would occur at Minidoka NHS under Alternative C. Although Wilson Butte and Wilson Butte Cave are not within the operational noise zone under Alternative C, Sid Butte is.

3.5.5.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would include substantially fewer turbines than Alternative B or C, as indicated in Table 3.5-6, and would therefore have less of an impact to cultural resources susceptible to visual and auditory impacts than those alternatives. The nearest turbine would be 5.5 miles from the Minidoka NHS Visitor Center (KOP 1), 6.5 miles from Minidoka NHS Honor Roll (KOP 16), 2.5 miles from Wilson Butte Cave (KOP 10), 1.4 miles from Sid Butte (KOP 17), and 9.4 miles from the Oregon Trail near Milner Ruts (KOP 4). The visual component of the non-physical APE for Alternative D includes 13% fewer previously recorded cultural resources potentially susceptible to visual impacts than Alternative B and 3% fewer previously recorded potentially susceptible resources than the visual component of the Alternative C non-physical APE, reinforcing the decreasing potential for visual impacts with the reduced number of turbines (see Table 3.5-6). In the visual component of the Alternative D non-physical APE, there would be 23% fewer estimated potentially susceptible resources than estimated for Alternative B, and 11% fewer than estimated for Alternative C.[23]

Consistent with the Section 3.16.1.2 (Visual Resources) analysis, Alternative D would have fewer turbine corridors and would therefore have a lower degree of visual change and impact to susceptible cultural resources than Alternative B or C. Reduction in the number of turbines under Alternative D would reduce changes in Tribal Treaty areas that could affect resource patterns or availability as compared to Alternatives B and C. Alternative D would have fewer susceptible cultural resources across each of the visual resources distance zones (immediate foreground, foreground, and middleground) as compared to Alternatives B and C (see Table 3.5-7). Alternative D would remove the most and farthest-east section of turbines, resulting in the lowest degree of visual changes from the project to the east of any action alternative. However, under Alternative D, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) would be nearly the same as Alternative C, but reduced compared to Alternative B, and would remain moderate and in the foreground. Turbines would be visible in a slightly greater portion of the field of vision compared to Alternative C (in an 83 degree arc). Compared to Alternative C, turbines under Alternative D would be focused to the northeast of KOP 1 and span a slightly greater, 13-mile portion of the horizon (where not blocked from view by intervening topography, vegetation, and structures). At KOP 1, as distances to the nearest turbine siting corridor based on viewer orientation increase from 1.7 miles under Alternative B to 5.5 miles under Alternatives C and D, the nearest potential turbine would appear 70% smaller in size under Alternatives D and C compared to Alternative B. Visual impacts in the area of Wilson Butte Cave (KOP 10) would also be approximately the same as Alternative C and reduced relative to Alternative B, but remain major and in the foreground. At KOP 10, turbines under Alternative D would be focused eastward only within a 98 degree arc and across up to 16 miles of the horizon, which would engross just over three-quarters of the human field of vision only if centered in view. At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternatives C and D, the nearest potential turbine would appear 60% smaller in size under Alternatives C and D compared to Alternative B. Visual impacts at the Oregon Trail near Milner Ruts (KOP 4) would also be about the same under Alternative D as Alternatives B and C, i.e., minor, and would begin at the far extent of the foreground transitioning mostly to the middleground. At KOP 4, turbines under Alternative D would be similarly focused northward but concentrated within only a 30 degree arc and spanning up to only 9 miles of the horizon, narrowed from both Alternatives B and C. At KOP 4, as distances to the nearest turbine siting corridor increase from 9.4 mile under Alternatives B and D to 10.8 miles under Alternative C, the nearest potential turbine would appear imperceptibly smaller between these alternatives, particularly when the nearest turbine is massed with other project turbines.

Cultural resources susceptible to non-physical impacts would primarily be historic buildings and structures, historic transportation corridors, and TCPs, and would be from the range of site types introduced in Section 3.5.5.1 (Affected Environment). Visual impacts from Alternative D at Minidoka NHS, Wilson Butte Cave, and other cultural resources on the western portion of the project would be similar to Alternative C, since Alternative D eliminates more eastward turbines, in addition to eliminating the same westward turbines as Alternative C. Also similar to Alternative C, visual impacts to susceptible cultural resources to the north would be slightly reduced under Alternative D as compared to Alternative B, with the elimination of turbine locations on the north side of ID 24. Alternative D would reduce visual impacts to susceptible cultural resources on the east over the other action alternatives; however, more susceptible cultural resources have been identified westward of the project. The applicant-committed measures, required mitigation, and additional measures under Alternative D would be the same as for other action alternatives.

[23] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

The auditory component of the non-physical APE for Alternative D includes 42% fewer previously recorded cultural resources potentially susceptible to auditory impacts than Alternative B, 29 compared to the 50 such resources of Alternative B, and 17% fewer than the 35 such resources of Alternative C. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. Since an average of eight cultural resources are estimated per square mile within the auditory component of the non-physical APE, approximately 1,909 cultural resources could occur within the auditory component of the non-physical APE for Alternative D, of which 191 could be susceptible to auditory impacts, resulting in 47% fewer estimated susceptible cultural resources than the estimated 361 potentially susceptible cultural resources in the auditory component of the non-physical APE for Alternative B, and 26% fewer than the 257 estimated for Alternative C. Audible impacts would result within up to 2.2 miles from the turbine corridors and 0.5 mile from the 500-kV transmission line siting corridors. These impacts would reach up to 11,441 acres (18 square miles) of Minidoka WRC (with potential impacts within 34% of the overall approximately 34,000-acre boundary; see Figure 3.19-11). The auditory component for Alternative D would reach 57% less than the 41 square miles reached for Alternative B and 26% more than the 14 square miles reached for Alternative C. Similar to Alternative C, the auditory component of the non-physical APE for Alternative D would not reach Minidoka NHS, and therefore no auditory impacts would occur at Minidoka NHS under either of these action alternatives. This represents a 100% reduction in potential auditory impacts at Minidoka NHS from Alternative B. Also, similar to Alternative C, although Wilson Butte and Wilson Butte Cave are not within the operational noise zone under Alternative D, Sid Butte is.

3.5.5.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

As indicated in Table 3.5-6, Alternative E would have fewer turbines than Alternative B or C but would have either fewer or more turbines than Alternative D depending on the type of turbines selected (3 MW or 6 MW). Under Alternative E, the nearest turbine would be 8.5 miles from the Minidoka NHS Visitor Center (KOP 1), 10.1 miles from the Minidoka NHS Honor Roll (KOP 16), 2.5 miles from Wilson Butte Cave (KOP 10), 1.4 miles from Sid Butte (KOP 17), and 12.2 miles from Oregon Trail near Milner Ruts (KOP 4). The visual component of the non-physical APE for Alternative E includes 13% fewer previously recorded potentially susceptible cultural resources than Alternative B, 1,560 compared to the 1,787 resources within the visual component of the Alternative B non-physical APE, 2% fewer previously recorded potentially susceptible cultural resources than the 1,599 such resources of Alternative C, and 0.3% more than the 1,556 previously recorded cultural resources potentially susceptible to visual impacts for Alternative D. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. However, because an average of 11 cultural resources are estimated per square mile within the non-physical APE, approximately 25,188 cultural resources would occur in the visual component of the Alternative E non-physical APE, of which approximately 10,327 could be susceptible to visual impacts.[24]. This would result in 6% more cultural resources susceptible to visual effects than the 9,764 estimated for Alternative D, but 19% fewer than the 12,748 estimated for Alternative B and 5% fewer than the 10,913 estimated for Alternative C.

Alternative E would have either more or fewer turbines compared to Alternative D, dependent on which turbines were selected; however, Alternative E is estimated to have more cultural resources susceptible to visual impacts in the viewshed of its turbine siting corridors, which results in a greater potential for visual effects over Alternative D, yet remains less than Alternatives B and C. Reduction in the number of turbines under Alternative E would reduce changes in Tribal Treaty areas that could affect resource patterns or availability as compared to Alternatives B, C, or D, dependent on which turbines are selected

[24] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

under Alternative D. Alternative E would have fewer susceptible cultural resources across each of the visual resources distance zones (immediate foreground, foreground, and middleground) as compared to the other action alternatives, except by middleground distances, it would exceed the numbers of Alternative D (see Table 3.5-7). Alternative E would result in a lower degree of visual changes to susceptible cultural resources than Alternative B or C, but not Alternative D, during construction, operation and maintenance, and decommissioning phases of the project's lifetime. However, under Alternative E, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) would be less than under Alternative B, equivalent to those under Alternative C and D, and moderated by a greater distance to Minidoka NHS from the nearest Alternative E turbine siting corridor, which would remove the corridor to the farther reaches of foreground distances and extending into the middleground. Compared to those of Alternatives B, C, and D, Alternative E turbines would be visible in a lesser range of vision (in a 60 degree arc) to the northeast of KOP 1 and across up to 15 miles of the horizon, which would occupy only half of the human (120 degree) field of vision if the center of focus (and where not blocked from view by intervening topography, vegetation, and structures). At KOP 1, as distances to the nearest turbine siting corridor based on viewer orientation increase from 1.7 miles under Alternative B to 5.5 miles under Alternatives C and D and 8.5 miles under Alternative E, the nearest potential turbine would appear 80% smaller in size under Alternative E compared to Alternative B and 35% smaller under Alternative E compared to Alternatives C and D. Visual impacts in the area of Wilson Butte Cave (KOP 10) would also be reduced under Alternative E as compared to Alternatives B, C, and D, but would remain major and in the foreground. At KOP 10, turbines under Alternative E would be focused eastward only within an 82 degree arc and across up to 14 miles of the horizon, which would engross just over two-thirds of the human field of vision only if centered in view. At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternatives C, D, and E, the nearest potential turbine would appear 60% smaller in size under Alternative E compared to Alternative B. Visual impacts at the Oregon Trail near Milner Ruts (KOP 4) would also be about the same under Alternative E as Alternatives B, C, and D, i.e., minor, and would begin in the farthest extent of the foreground and transition to be mostly situated in the middleground. At KOP 4, turbines under Alternative E would be similarly focused northward but concentrated within only a 48 degree arc and spanning up to 16 miles of the horizon, not too different from Alternative C, and in between the ranges for Alternatives B and D. At KOP 4, as distances to the nearest turbine siting corridor increase from 9.4 mile under Alternatives B and D to 10.8 miles under Alternative C and 12.2 miles under Alternative E, the nearest potential turbine would continue to appear imperceptibly smaller between the action alternatives, particularly when the nearest turbine is massed with other project turbines.

Cultural resources susceptible to non-physical impacts would primarily be historic buildings and structures, historic transportation corridors, and TCPs, and would be from the range of site types introduced in Section 3.5.5.1 (Affected Environment). Alternative E would have a lower visual impact to the nationally significant Minidoka NHS and the Oregon National Historic Trail than would Alternative B, C, or D. The Alternative E non-physical APE contains fewer field-verified Oregon trail segments (numbering four) than those within the non-physical APEs for Alternatives B, C, and D (which each contain seven field-verified trail segments) or the Preferred Alternative (which contains six field-verified trail segments). Alternative E would have a greater reduction in the number of project turbines to the south than Alternative B, C, or D and would eliminate the westernmost turbines and the turbines north of ID 24 to the same degree as Alternatives C and D. Consequently, Alternative E would have a greater reduction in visual impacts at Minidoka NHS and other cultural resources on the south and southwest of the project than would Alternative B, C, or D. The applicant-committed measures, required mitigation, and additional measures under Alternative E would be the same as for other action alternatives.

The auditory component of the non-physical APE for Alternative E includes 44% fewer previously recorded cultural resources potentially susceptible to auditory impacts than Alternative B, 28 compared to the 50 resources potentially susceptible from Alternative B, 20% fewer than the 35 such resources of

Alternative C, and 3% less than the 29 such resources of Alterative D. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. Since an average of eight cultural resources are estimated per square mile within the auditory component of the non-physical APE, approximately 2,179 cultural resources could occur within the auditory component of the non-physical APE for Alternative E, of which 218 could be susceptible to auditory impacts, resulting in 40% fewer estimated susceptible cultural resources than the estimated 361 potentially susceptible cultural resources in the auditory component of the non-physical APE for Alternative B, 15% fewer than the 257 estimated for Alternative C, and 14% more than the 191 estimated for Alternative D. Audible impacts would result within up to 2.2 miles from the turbine corridors and 0.5 mile from the 500-kV transmission line siting corridors. The auditory component of the APE for Alternative E would not reach Minidoka WRC and would therefore result in 100% less potential auditory impact to Minidoka WRC than Alternative B, and proportionally less than Alternatives C and D. Similar to Alternatives C and D, the auditory component of the non-physical APE for Alternative E would not reach Minidoka NHS, and therefore no auditory impacts would occur at Minidoka NHS under any of these action alternatives. This represents a 100% reduction in potential auditory impacts at Minidoka NHS from Alternative B. Similar to Alternatives C and D, although Wilson Butte and Wilson Butte Cave are not within the operational noise zone under Alternative E, Sid Butte is.

3.5.5.2.6 PREFERRED ALTERNATIVE

As indicated in Table 3.5-6, the BLM's Preferred Alternative would have fewer turbines than any other action alternative (3 MW or up to 5 MW). The Preferred Alternative would also have potentially shorter turbines than other action alternatives, reaching no greater than 600 feet tall at turbine tip with use of 5-MW turbines (in contrast to other action alternatives, which could use up to 6-MW turbines reaching 740 feet in height at blade tip). The nearest turbine siting corridor would be 8.9 miles from the Minidoka NHS Visitor Center (KOP 1), 8.7 miles from the Minidoka NHS Honor Roll (KOP 16), 4.4 miles from Wilson Butte Cave (KOP 10), 2.1 miles from Sid Butte (KOP 17), and 12.7 miles from Oregon Trail near Milner Ruts (KOP 4). The visual component of the non-physical APE for the Preferred Alternatives includes 11% fewer previously recorded potentially susceptible cultural resources than Alternative B, 1,599 compared to the 1,787 resources within the visual component of the Alternative B non-physical APE, approximately the same amount of previously recorded potentially susceptible cultural resources as the 1,599 such resources of Alternative C, 3% more than the 1,556 previously recorded cultural resources potentially susceptible to visual impacts for Alternative D, and 2% more than the 1,560 previously recorded cultural resources potentially susceptible to visual impacts for Alternative E. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. However, because an average of 11 cultural resources are estimated per square mile within the non-physical APE, approximately 24,664 cultural resources would occur in the visual component of the Preferred Alternative non-physical APE, of which approximately 10,112 could be susceptible to visual impacts.[25] This would result in 21% fewer than the 12,748 estimated for Alternative B, 7% fewer than the 10,913 estimated for Alternative C, 4% more than the 9,764 estimated for Alternative D, and 2% fewer than the 10,327 estimated for Alternative E.

Consistent with the Section 3.16.1.2 (Visual Resources) analysis, the Preferred Alternative would require the least number of turbine corridors and would therefore have the lowest degree of visual change and impact to susceptible cultural resources of any action alternative. Reduction in the number of turbines under the Preferred Alternative would reduce changes in Tribal Treaty areas that could affect resource patterns or availability as compared to any other action alternative. The Preferred Alternative would

[25] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

reduce the susceptible cultural resources across each of the visual resources distance zones (immediate foreground, foreground, and middleground) as compared to Alternative B (see Table 3.5-7). The Preferred Alternative includes the lowest number of turbine corridors with the removal of the farthest-west and many south sections of turbines, resulting in the lowest number and potentially shortest turbines, for a reduction of visual impacts from the project in relation to the other action alternatives. Under the Preferred Alternative, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) and from the larger Minidoka WRC would be reduced compared to all other action alternatives. Under the Preferred Alternative, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) would be the most moderated by distance from nearest turbine siting corridor, removed to the farther reaches of foreground distances, and extended into the middleground. Preferred Alternative turbines would be visible in the smallest range of vision (in a 55 degree arc) to the northeast of KOP 1 and across up to 12 miles of the horizon, which would occupy less than half of the human (120 degree) field of vision if the center of focus (and where not blocked from view by intervening topography, vegetation, and structures). At KOP 1, as distances to the nearest turbine siting corridor based on viewer orientation increase from 1.7 miles under Alternative B to 5.5 miles under Alternatives C and D, to 8.5 miles under Alternative E, and to 8.8 miles under the Preferred Alternative, the nearest turbine would appear 81% smaller in size under the Preferred Alternative compared to Alternative B, 37% smaller under the Preferred Alternative compared to Alternatives C and D, and 3% smaller under the Preferred Alternative compared to Alternative E, assuming the same turbine height was used under each alternative. Under the Preferred Alternative, visual impacts in the area of Wilson Butte Cave (KOP 10) would also be reduced as compared to all other action alternatives; however, these impacts would remain major and in the foreground under the Preferred Alternative. At KOP 10, turbines under the Preferred Alternative would be focused eastward only within a 57 degree arc and across approximately 12 miles of the horizon, which would engross just under half of the human field of vision only if centered in view. At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternatives C, D, and E, and to over 4 miles under the Preferred Alternative, the nearest potential turbine would appear 78% smaller under the Preferred Alternative compared to Alternative B, 37% smaller under the Preferred Alternative compared to Alternatives C, D, and E assuming the same turbine height was used under each alternative. Visual impacts at the Oregon Trail near Milner Ruts (KOP 4) would also be about the same under the Preferred Alternative as other action alternatives, i.e., minor, and would begin at the farthest extents of foreground and transition with increased distance to mostly be in the middleground. At KOP 4, turbines under the Preferred Alternative would be similarly focused northward but concentrated within only a 45 degree arc and spanning approximately 15 miles of the horizon, not too different from Alternatives C and E, and in between the ranges for Alternatives B and D. At KOP 4, as distances to the nearest turbine siting corridor increase from 9.4 miles under Alternatives B and D to 10.8 miles under Alternative C, to 12.2 miles under Alternative E, and to 12.6 miles under the Preferred Alternative, the nearest potential turbine would continue to appear imperceptibly smaller between the action alternatives, particularly when the nearest turbine and other project turbines concentrate within a smaller and narrower field of view with distance.

Cultural resources susceptible to non-physical impacts would primarily be historic buildings and structures, historic transportation corridors, and TCPs or other Tribal resources, and would be from the range of site types introduced in Section 3.5.5.1 (Affected Environment). However, the Preferred Alternative would have the least visual impacts to the nationally significant Minidoka NHS and Wilson Butte Cave. The Preferred Alternative non-physical APE contains slightly more trail segments (numbering six) than Alternative E (which has four segments) and fewer field-verified Oregon Trail segments than those within the non-physical APEs for Alternatives B, C, and D (which each contain seven field-verified trail segments). Beyond the Oregon Trail, the Preferred Alternative would have a similar reduction in the number of project turbines to the south as Alternative E and a greater reduction than other action alternatives, while further eliminating westernmost turbines. Consequently, of all the action alternatives, the Preferred Alternative would have the greatest reduction in visual impacts at

Minidoka NHS and other cultural resources south and southwest of the project, except at the Oregon Trail, where Alternative E would have fewer impacts to segments of that historic trail compared to other action alternatives. Changes in Tribal Treaty areas that could affect resource patterns or availability would be reduced under the Preferred Alternative as compared to other action alternatives. The applicant-committed measures, required mitigation, and additional measures under the Preferred Alternative would be the same as for the other action alternatives.

The auditory component of the non-physical APE for the Preferred Alternative includes 46% fewer previously recorded cultural resources potentially susceptible to auditory impacts than Alternative B, 27 compared to the 50 resources potentially susceptible from Alternative B, 23% fewer than the 35 such resources of Alternative C, 7% fewer than the 29 such resources of Alterative D, and 4% fewer than the 28 such resources of Alternative E. Please refer to Table 3.5-6 for the comparison of resource totals between action alternatives. Since an average of eight cultural resources are estimated per square mile within the auditory component of the non-physical APE, approximately 2,012 cultural resources could occur within the auditory component of the non-physical APE for the Preferred Alternative, of which 201 could be susceptible to auditory impacts, resulting in 44% fewer estimated susceptible cultural resources than the estimated 361 potentially susceptible cultural resources in the auditory component of the non-physical APE for Alternative B, 22% fewer than the 257 estimated for Alternative C, 5% more than the 191 estimated for Alternative D, and 8% fewer than the 218 estimated for Alternative E. Audible impacts would result within up to 2.2 miles from the turbine corridors and 0.5 mile from the 500-kV transmission line siting corridors. The auditory component of the APE for the Preferred Alternative would not reach Minidoka WRC and therefore would result in 100% less potential auditory impact to Minidoka WRC than for Alternative B, and proportionally less than any of the other action alternatives. Similar to under Alternatives C, D, and E, the auditory component of the non-physical APE for the Preferred Alternative would not reach the Minidoka NHS, and therefore no auditory impacts would occur at Minidoka NHS under any of these action alternatives. This represents a 100% reduction in potential auditory impacts at Minidoka NHS from Alternative B. Unlike under Alternatives B, C, D, and E, but the same as under the no action alternative (Alternative A), Wilson Butte, Wilson Butte Cave, and Sid Butte are not within the operational noise zone under the Preferred Alternative.

3.5.5.2.7 CUMULATIVE IMPACTS

As noted in Section 3.5.5.1 (Affected Environment), some of the existing and future actions identified have occurred or would occur in the non-physical APE; therefore, cumulative non-physical impacts to cultural resources, including Tribal resources described under Treaties, would result from the project when added to those actions. These existing and future actions include agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. The non-physical impacts of the project would be additive to the non-physical impacts of existing and future actions where they occur on the same cultural resources. The existing and future actions, particularly other wind energy generation facilities, would be visible from most cultural resources in the non-physical APE and, where these cultural resources are susceptible to visual impacts, cumulative effects would result.

As noted in Section 3.5.5.1, approximately 1,787 cultural resources are potentially subject to visual impacts, and 50 of these are also potentially subject to auditory impacts within the non-physical APE.[26]

[26] See the EIS methodology for estimating cultural resources within the non-physical APE potentially susceptible to visual and auditory impacts in Section 3.5.5.1. All of these estimated cultural resources may not be eligible; identification and eligibility determination efforts are currently underway. Implementation of the PA would identify affected resources and determine eligibility.

The addition of project transmission line structures and turbine towers to existing transmission line structures and other future transmission line structures and turbine towers planned in the non-physical APE would result in cumulative visual impacts to these estimated 1,787 cultural resources subject to visual impacts from the Lava Ridge Wind Project, 50 of which are also subject to auditory impacts. These future actions include the Taurus Wind Project introducing 1,500 MW of turbines into the visual setting, the 1,500 MW of proposed solar generation facilities, and the SWIP-North and Gateway West transmission lines adding 90.08 more miles of intermittently spaced towers (see Figures 3.1-1 and 3.5-2). The 800-MW Salmon Falls Wind Project is 30 miles from the project, and at this distance, it would introduce visual impacts to those cultural resources that are between it and the project. All alternatives that create greater setbacks for the project from Minidoka NHS also create greater project setbacks from the Salmon Falls Wind Project and, therefore, cumulative effects of the project are reduced as described below.

Under Alternatives C through E and the Preferred Alternative, foreground viewers along the western edge of the project would have a reduced degree of visual changes due to fewer turbines there. As a result, visual and cumulative impacts as seen from Minidoka NHS, from Minidoka WRC, and from the NRHP-listed Wilson Butte Cave would specifically be reduced compared to Alternative B. Also, cumulative visual effects to susceptible cultural resources to the north would be slightly reduced under Alternatives C through E and the Preferred Alternative as compared to Alternative B, with the elimination of turbine location on the north side of ID 24 under Alternatives C through E.

The Preferred Alternative would have the fewest turbines, Alternative E would have either fewer or more turbines than Alternative D, depending on the type of turbines selected (3 MW or 6 MW), and these alternatives would have fewer turbines than Alternatives B and C. Fewer turbines would result in less potential cumulative visual and auditory impacts to cultural resources susceptible to such impacts. Cumulative changes in Tribal Treaty areas that could affect resource patterns or availability would be reduced under the Preferred Alternative as compared to other action alternatives. The Preferred Alternative would have approximately the same amount of estimated cultural resources susceptible to visual impacts near its siting corridors as Alternative E. In general, the Preferred Alternative and Alternative E have more estimated cultural resources susceptible to visual impacts near its siting corridors than does Alternative D, and would have slightly greater potential for non-physical cumulative impacts than Alternative D. However, Alternative E along with the Preferred Alternative would have the greatest reduction in the number of project turbines to the south than any of the other action alternatives. The Preferred Alternative would eliminate the most turbines. Alternatives, C, D, and E would eliminate turbines to a similar degree from the west and north of the Alternative B siting corridors. Of all the action alternatives, the Preferred Alternative would have the greatest reduction in cumulative visual impacts at Minidoka NHS, Minidoka WRC, Wilson Butte Cave, and other cultural resources on the south and southwest of the project, where the greatest numbers of susceptible cultural resources are located. The exception would be for field-verified segments of the Oregon Trail, where Alternative E would have cumulative impacts to the least extent and the Preferred Alternative to the second-least extent. The Preferred Alternative would have the greatest reduction of cumulative auditory impacts at Minidoka NHS and Minidoka WRC, as well as the greatest reduction in cumulative auditory impacts at other cultural resources on the south and southwest of the project where the greatest numbers of susceptible cultural resources are located. These include Wilson Butte, Wilson Butte Cave, and Sid Butte. The Oregon Trail is outside the auditory component of the non-physical APE analyzed for the project. As a result, the Preferred Alternative would have reduced potential for non-physical cumulative impacts over all the other action alternatives, except it would have the potential for impacts on a slightly greater extent of the Oregon Trail than Alternative E.

3.5.5.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

An irretrievable commitment of cultural resources would occur under all action alternatives for up to 34 years for project construction, operation, and decommissioning due to visual non-physical impacts from installation of new vertical aboveground infrastructure. The duration of auditory non-physical impacts from project infrastructure would be the 30-year operation phase. As described above, non-physical impacts on cultural resources could include visual and auditory impacts where setting, feeling, or association are important site characteristics. Non-physical impacts would be both short term during construction and decommissioning and long term during operation. Long-term effects (visual and auditory impacts) on the preservation of cultural resources would persist until operations cease and the aboveground infrastructure is removed. This would include related irreversible effects to significant cultural resources of the Japanese American community and of Tribes.

3.5.5.4 Compensatory Mitigation

In addition to the implementation of applicant-committed measures and other mitigation (see EIS Appendix 4), additional measures to avoid, minimize, or mitigate non-physical impacts to cultural resources would be developed and implemented under the HPMP as part of the project's PA (see EIS Appendix 8) under the NHPA Section 106 process. Should the BLM require the burying of collector lines in functional greater sage-grouse habitat as mitigation, this reduced amount of aboveground line structures within the siting corridors would not greatly decrease the visual effects to cultural resources susceptible to visual impacts due to the relatively diminutive size of aboveground line structures amid the more prominent turbines.

Even with the implementation of avoidance, minimization (through alternatives development and removing turbine corridors closest to Minidoka NHS), and mitigation measures for historic properties, residual impacts to the Tribes and Japanese American and Minidoka-connected communities could still occur, and these impacts would require compensatory mitigation. The following compensatory mitigation measures could be applied to any action alternative if the BLM determines it is warranted (see Table App4-5 in EIS Appendix 4):

- **Measure VI:** Through ongoing Government-to-Government consultation, the BLM would continue soliciting input from the Shoshone-Bannock Tribes and Shoshone-Paiute Tribes and would apply that input to avoid, minimize, and mitigate project impacts to Native American Tribes. This consultation would include soliciting input from Native American Tribes on compensatory mitigation plans for which the BLM has included Mitigation Frameworks in EIS Appendix 4.
- **Measure VII:** See the Mitigation Framework for Key Resources and Values Associated with Minidoka NHS section in EIS Appendix 4.

Implementation of mitigation under measures VI and VII would not directly reduce any project-related effects but would aim to compensate for project-related effects indirectly, by funding actions which are desired by Tribes and the Japanese American community. Compensatory mitigation measure VII for the Minidoka NHS interpretive purpose could also serve as compensatory mitigation for non-physical residual impacts to Minidoka NHS and any historic properties potentially susceptible to visual impacts within and associated with Minidoka WRC. The BLM and the Office of Collaborative Action and Dispute Resolution have implemented proactive approaches to solicit input on the EIS from members of the Japanese American community; this process is considered ongoing. Additional mitigation measures would be discussed with a Minidoka NHS stakeholder committee, including members of the Japanese

American and Minidoka-connected communities, for adverse effects to Minidoka NHS. The BLM would also continue to solicit input from Tribes regarding potential mitigation measures for adverse effects to facilitate collaborative decision making throughout Section 106 consultation and government-to-government consultation on the project. Similar to development of measures to avoid, minimize, or mitigate non-physical impacts to cultural resources under the HPMP as part of the project's PA, compensatory mitigation measures (should the BLM determine these are warranted) would be developed and implemented through the Section 106 consultation process under the HPMP, under the PA.

3.6 ENVIRONMENTAL JUSTICE AND SOCIOECONOMICS

3.6.1 Environmental Justice Communities

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.6-1.

Table 3.6-1. Analysis Approach for Environmental Justice Communities

Issue Analyzed in Detail	How would the project affect environmental justice communities, and would these effects be disproportionately adverse?
Associated Issues Analyzed in Brief	AIB-11: How would the project impact emergency responders that serve the project vicinity? AIB-17: Would construction of the project limit or restrict access to locatable minerals in and around the project? AIB-18: Would the project limit or restrict access to saleable minerals (materials such as gravel and rock quarries, for example) available from BLM public lands in and around the project? AIB-19: Would construction of the project limit or restrict access to leasable minerals in and around the project? AIB-29: How would the project contribute to changes or degradations to resources that would affect hunting spending? AIB-45: How would hazardous materials and wastes generated by the project be managed? Would they exceed capacities of approved disposal facilities? AIB-46: How would solid wastes generated by the project (packaging materials and employee-generated wastes) be managed? Would they exceed capacities of approved disposal facilities?
Analysis Area	All census tracts and block groups within Lincoln, Jerome, Minidoka, Gooding, Cassia, and Twin Falls Counties (Figure 3.6-1). This analysis area is intended to represent all communities in the project vicinity that could be affected by project construction, operation, or decommissioning, either directly or indirectly. The analysis area also includes geographically dispersed environmental justice populations as described in further detail in Section 3.6.1.1 (Affected Environment) and EIS Appendix 9 (Additional Background Information).
Reference Populations	Census tracts and block groups represent different scales of analysis, and each are compared to a different reference population to draw conclusions about the presence or absence of environmental justice communities. Reference populations for census tracts and block groups are defined as follows: • Census tracts: The reference population for each census tract is the county that census tract falls within. • Block groups:[27] The reference population for each block group is the census tract that block group falls within.
Indicators	Minority populations in the analysis area that meet or exceed 50% of the analysis area population or that meet or exceed 110% of the reference community's minority population. Low-income populations in the analysis area that meet or exceed 50% of the analysis area population or that are greater than or equal to that of the reference population. Tribal populations in the analysis area that are greater than or equal to that of the reference population. Geographically dispersed environmental justice populations and associated resources of concern within the analysis area. Ecological, cultural, human health, economic, and social impacts when those impacts are interrelated to impacts on the natural and physical environment, taking into account past impacts on the environmental justice population from any source. Disproportionate adverse impacts to the identified environmental justice communities when compared to impacts on the analysis area population.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Described in section text.

[27]Block groups are statistical divisions of census tracts that usually contain between 600 and 3,000 people. Because of privacy concerns, data are usually precluded from being presented for block groups. Block groups are used to evaluate low-income and minority populations only. Tribal populations were identified at the larger scale of census tracts only due to the low number of individuals within the Native American and Alaska Native category at the block group level.

Assumptions or Approach	Analytical assumptions to clarify best-available data sources or modeling limitations for the environmental justice analysis are as follows: • The population demographics remain consistent with predicted patterns and trends. • The impacts of decommissioning would be the same in scope as those described for construction. • The entire workforce needed for project construction and operation would be non-local workers (i.e., from outside the tri-county area). Although MVE would hire as many local workers as possible, the number or percentage of local hires is unknown, and assuming all workers would be non-local provides a conservative basis for impact analysis. • Assumptions and findings made in the Economic and Fiscal Impacts Report: Two Proposed Southern Idaho Windfarms and the SWIP-North Transmission Line in Southern Idaho and Eastern Nevada (Black and Peterson 2020) are based on established models and best available data and are therefore reasonable and apply to this impact analysis.

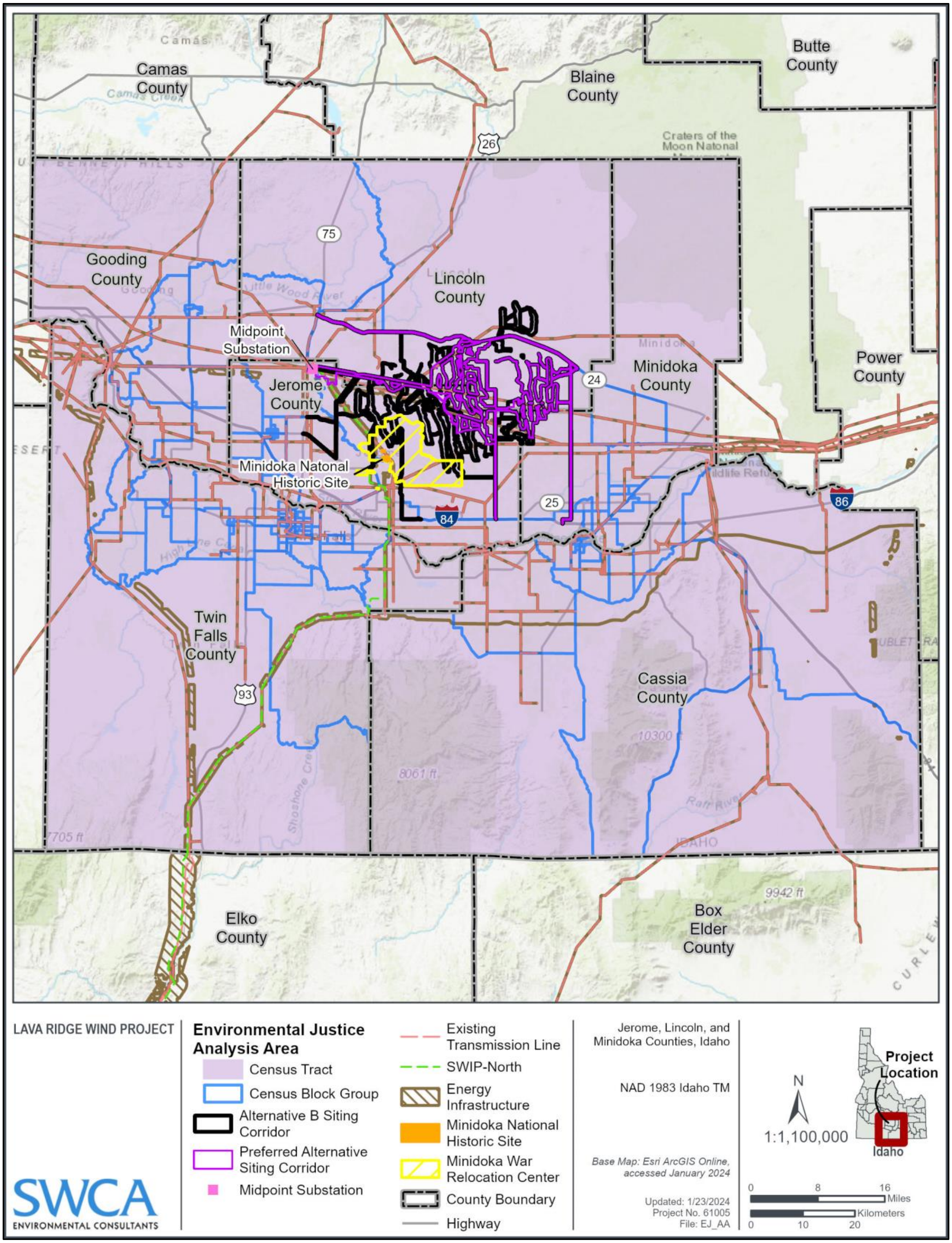

Figure 3.6-1. Environmental justice analysis area.

3.6.1.1 Affected Environment[28]

Consideration of environmental justice issues is mandated by EO 12898, which was published on February 11, 1994. Environmental justice is the fair treatment and meaningful involvement of all potentially affected people, regardless of race, color, national origin, or income, when the federal government develops, implements, and enforces environmental laws, regulations, and policies, such as the review of the project (BLM 2022a). Specific information on environmental justice populations evaluated in this EIS—low-income, minority, Tribal populations, and dispersed environmental justice communities (Japanese American and Minidoka-connected communities and Native American Tribes)—who reside within the analysis area or would otherwise be affected by the Lava Ridge Wind Project is provided in EIS Appendix 9.

3.6.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Low-Income, Minority, and Tribal Populations

Existing and future infrastructure development projects (see Figures 3.6-1 and 3.6-2) have influenced and continue to influence low-income and minority populations in the analysis area through increased local and regional jobs and community infrastructure, increased traffic, noise, dust, odor, light pollution, and visual effects. The intensity of these impacts varies depending on the proximity of the actions to low-income and minority communities. In addition, the existing effects of climate change have increased human health and safety risks associated with wildfire and extreme heat and cold events for all residents of Idaho. Low-income and minority populations may be disproportionately affected by the effects of both existing and future infrastructure development projects and climate change, in part, due to social vulnerabilities that make it difficult for these populations to prepare for, cope with, respond to, and recover from the adverse effects of infrastructure development projects and climate change (EPA 2016, 2021).

[28] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

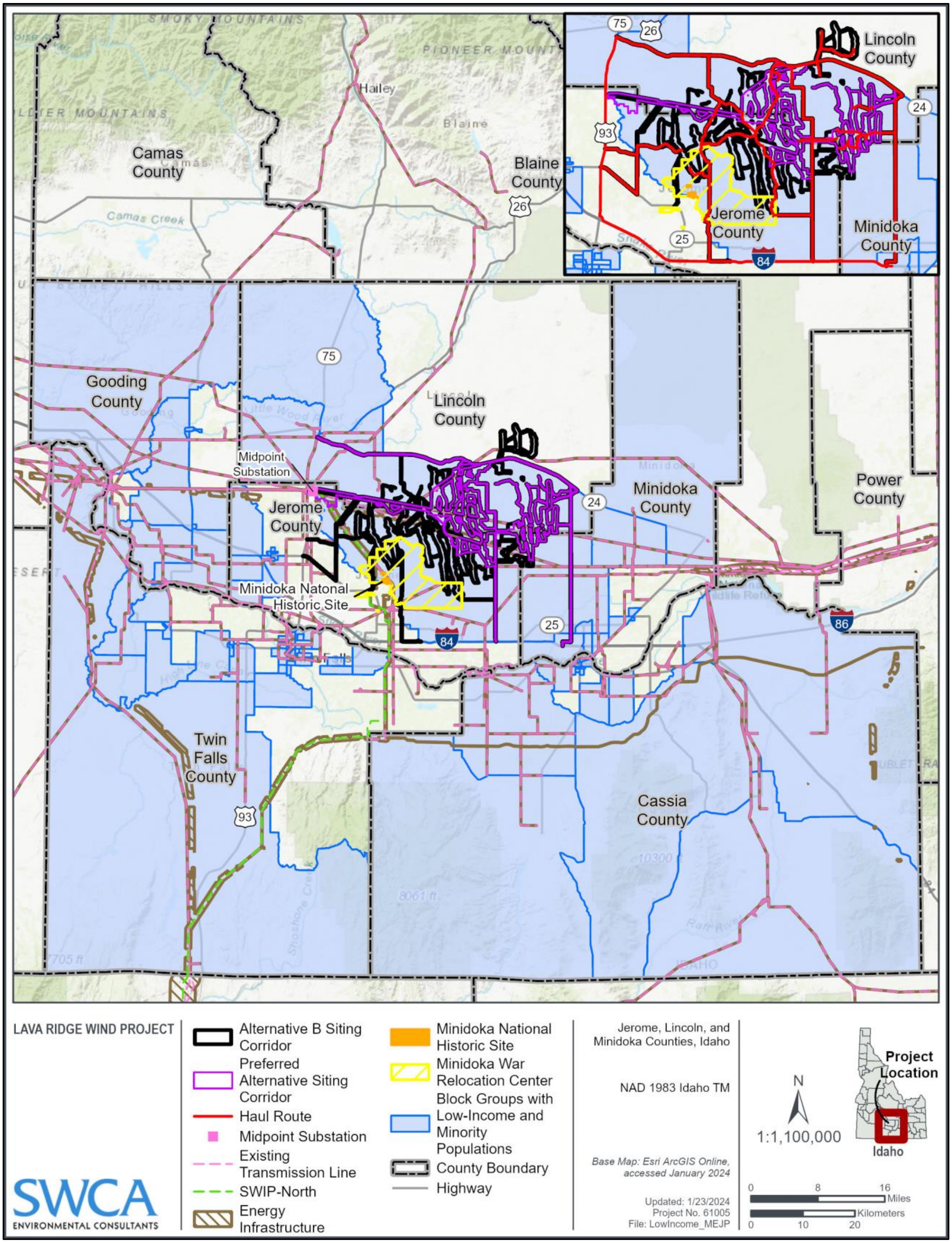

Figure 3.6-2. Block groups with low-income and minority environmental justice populations within the analysis area.

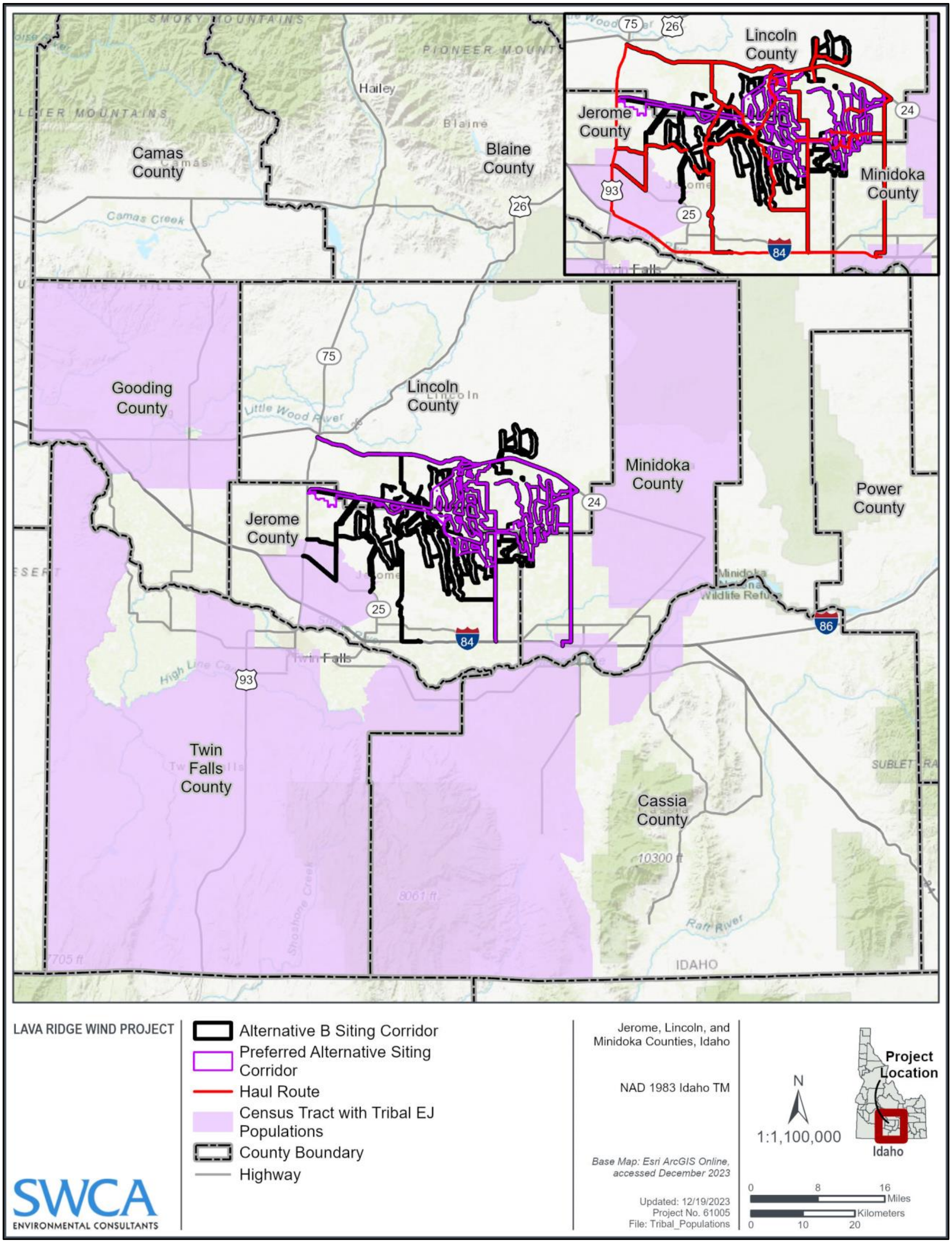

Figure 3.6-3. Census tracts with Tribal environmental justice populations in the analysis area.

Dispersed Environmental Justice Communities

Japanese American and Minidoka-Connected Communities

The construction of past transportation and utility infrastructure projects within the viewshed and soundscape of Minidoka NHS and Minidoka WRC (see Figure 3.6-2) has incrementally impacted the setting and feeling of the sites over time. Past modifications to the landscape character near Minidoka NHS and Minidoka WRC have had a commensurate effect on visitor experience by reducing visitors' experience of remoteness, isolation, and abandonment, which is needed to engage in remembrance and healing. Changes to the setting, feeling, and visitor experience at Minidoka NHS and Minidoka WRC are viewed by members of the Japanese American and Minidoka-connected communities as acts of intrusion and desecration to a sacred site and a continuation of racial injustice (BLM 2022c).

The Japanese American and Minidoka-connected communities have expressed feelings of having their concerns marginalized or ignored regarding effects of existing and future planned development projects. Historical interactions between the Japanese American community, the federal government, and project developers have been filled with ongoing points of frustration and conflict, which has reinforced feelings of distrust and being dishonored within the Japanese American community (BLM 2022c). This includes concerns expressed by the Japanese American community regarding the SWIP-North 500-kV transmission line corridor, which has been authorized for construction and crosses through Minidoka WRC, as well as a proposed nearby feedlot. The Japanese American community has repeatedly expressed their concerns over the effects of previously proposed projects on Minidoka NHS and Minidoka WRC, and the community views any continued proposals for development in the area as an affront to their community and a continuation of the injustice that Minidoka NHS represents (BLM 2022c). The collective effect of past and present development projects on the Japanese American community and their respective interests and concerns has left members of the community with feelings of betrayal, resentment, and anger at the desecration of the site and their families' and community's historical and continued injustice.

Comments received during public scoping pointed to "America's changing commemorative landscape," which is described as a growing trend in governmental and societal actions aimed at making America's commemorative landscape more inclusive and reflective of America's rich and diverse heritage and to tell the whole story, including the stories of Japanese Americans and the Asian American Native Hawaiian Pacific Islander (AANHPI) community. Evidence of this trend is seen in recent Presidential proclamations and direction from Congress through authorizing legislation and annual appropriations bills; recent additions of sites and resources to national parks, memorials and museums; and the DOI's recent budget requests and Secretarial guidance. The following list of existing and future trends and actions provides examples of America's changing commemorative landscape that have, or will, contribute to beneficial effects for the Japanese American and Minidoka-connected communities.

- Recent governmental actions that contribute to America's changing commemorative landscape include the following:
  - The John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019, which ratified the Tule Lake National Monument, redesignated the Honouliuli National Historic Site, and authorized the NPS to study the Amache Relocation Center in Colorado as a new unit of the National Park System
  - Bipartisan legislation passed in 2022, which authorized the NPS to establish the Amache National Historic Site in Colorado as a new unit of the National Park System
- Many existing and ongoing commemorative events are centered around the Minidoka NHS and Minidoka-connected communities and serve to engage and be led by the Japanese American and Minidoka-connected communities while also providing opportunities for remembrance,

education, healing, sharing stories, and connecting the Japanese American diaspora and multiple generations. These events are as follows:

  - Events sponsored by the Minidoka Pilgrimage Planning Committee and the Japanese American Citizens League at "Camp Harmony" in Puyallup, Washington
  - Commemorative events sponsored by the Friends of Minidoka and Japanese American Citizens League in Idaho
  - Commemorative events at Bainbridge Island, Washington, to mark the forced relocation of the Bainbridge Island Japanese American community on March 30, 1942, sponsored by the Bainbridge Island Japanese American Exclusion Memorial Association and the Bainbridge Island Japanese American Community
  - Annual in-person pilgrimages to Minidoka NHS

- In 2006, Congress established the Japanese American Confinement Sites grant program (Public Law 109-441, 120 Stat. 3288) for the preservation and interpretation of incarceration sites where Japanese Americans were detained during WWII. The law authorized up to $38 million for the entire life of the grant program to identify, research, evaluate, interpret, protect, restore, repair, and acquire historic incarceration sites so that present and future generations may learn and gain inspiration from these sites and so that these sites can demonstrate the nation's commitment to equal justice under the law. Since the first appropriation in fiscal year 2009, the NPS has awarded 269 grants totaling more than $35 million. Past projects have included building rehabilitations, documentary films, and the development of educational curricula for educators. More than $3.4 million in grants were awarded in 2023 to preserve and interpret WWII Japanese American confinement sites (NPS 2023).
- Regional and national museums, which help tell the story of the Japanese American and AANHPI experiences during WWII, have received significant investments in recent years. In 2021, the Japanese American Museum of Oregon opened a new building in Portland, Oregon, with a focus on Oregon's Nikkei community and the WWII incarceration (Japanese American Museum of Oregon 2023). The Wing Luke Museum in Seattle, Washington, opened a special exhibit from 2022 to 2023 about the Japanese American incarceration during WWII (Wing Luke Museum 2023). In 2022, Congress passed legislation to authorize a commission to study the potential creation of a National Museum of Asian Pacific American History and Culture (U.S. Congress 2022).
- In their 2023 fiscal year budget, the NPS allocated funding for the rehabilitation of a non-historic maintenance facility at Minidoka NHS containing a carpentry shop, equipment repair bays, offices, and workspaces for park staff. The rehabilitation project is intended to support park operations and ensure the safety of park staff. The NPS also allocated funding for continued operations and maintenance of the Minidoka NHS visitor center to ensure the facility remains open for recreational access and enjoyment (NPS 2023).

Native American Tribes

As described in Section 3.5 (Cultural Resources), existing trends and actions that have impacted Native American resources of concern include agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing linear features (e.g., roads, transmission lines, railroads), electrical substations, existing wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. These existing trends and actions have resulted in adverse effects to Native American resources of concern through direct disturbance of cultural resources, increasing access to sensitive cultural resources, and modifications to the setting and feeling of resources of Native American concern.

Comments received during public scoping pointed to the following examples of America's changing commemorative landscape that have, or could, contribute to beneficial effects for Native American communities:

- The BLM's work to preserve sacred sites for Tribal Nations on lands adjacent to the Chaco Culture National Historical Park (BLM 2022d)
- President Biden's designation of the Avi Kwa Ame National Monument in 2023 (White House Press Office 2023)

3.6.1.2 Impacts

3.6.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and environmental justice communities would only be affected by existing and future trends and actions.

3.6.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Potential impacts to environmental justice communities under Alternative B are described here based on detailed project information, environmental impact analyses, and whether high and adverse impacts would be experienced disproportionately by environmental justice communities (Table 3.6-2). Potential impacts to low-income and minority populations who reside within the analysis area are discussed separately from potential impacts to geographically dispersed environmental justice populations because of key differences in how and why these populations occupy and use the analysis area, which in turn leads to different types of impacts for each community.

Low-Income, Minority, and Tribal Populations

Potential impacts to low-income, minority, and Tribal environmental justice populations would consist of increased noise, increased traffic, increased dust and air pollution, shadow flicker, and changes to the visual character of the analysis area. Potential impacts to property values in environmental justice communities may occur; however, the likelihood or degree to which property values may or may not be affected cannot be predicted with any certainty for the reasons outlined in Section 3.6.4 (Residential Property Values) in EIS Appendix 15.

Generally speaking, the degree of potential impacts would be greatest for environmental justice populations closest to the siting corridors and haul routes; these include the town of Hazelton (4.5 miles from the nearest siting corridors and 1 mile from nearest haul route), the city of Shoshone (immediately adjacent to the nearest siting corridors and haul route), the town of Paul (approximately 1 mile from the nearest siting corridor and haul route), and several scattered rural residences that are within proximity of the siting corridors or haul routes. Within low-income and minority block groups, the closest residence to the siting corridors is approximately 1,000 feet, the closest residences to haul routes are immediately adjacent, and there are approximately 30 residences within 1 mile or less of the siting corridors. Table 3.6-2 summarizes the effects to low-income, minority, and Tribal environmental justice populations across all the action alternatives.

Table 3.6-2. Summary of Impacts to Low-Income, Minority, and Tribal Populations

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Low-income populations in the analysis area	Low-income environmental justice populations are present within 24 census tracts and 69 block groups within the six-county analysis area. Of these, four low-income census tracts and three low-income block groups are intersected by the siting corridors.	Siting corridors intersect three low-income census tracts and three low-income block groups.	Siting corridors intersect three low-income census tracts and two low-income block groups.	Same as Alternative C	Same as Alternative C
Minority populations in the analysis area	Minority environmental justice populations are present within 13 census tracts and 52 block groups within the six-county analysis area. Of these, one minority census tract and two minority block groups are intersected by the siting corridors.	Same as Alternative B	Siting corridors intersect one minority census tract and one minority block group.	Same as Alternative B	Same as Alternative B
Tribal populations in the analysis area	Tribal environmental justice populations are present within 15 census tracts within the six-county analysis area. Of these, two Tribal census tracts are intersected by the siting corridors.	Siting corridors intersect one Tribal census tract.	Siting corridors do not intersect any Tribal census tracts.	Same as Alternative C	Same as Alternative C
Disproportionate impacts to identified environmental justice communities	Noise, traffic, shadow flicker, and visual impacts would be high and adverse where residents live near the siting corridors and haul routes, and would be disproportionately borne by low-income, minority, and Tribal environmental justice populations who make up most of the population in affected areas. Alternative B would impact the greatest number of environmental justice communities out of all the action alternatives.	Compared to Alternative B, fewer environmental justice residences and communities near the western siting corridors and haul routes would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternatives D and E, more environmental justice communities near the southern and eastern siting corridors would be subject to disproportionately high and adverse effects.	Compared to Alternatives B and C, fewer environmental justice residences and communities in the western and eastern portions of the siting corridors would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternative E, the number of impacted communities would be similar, but the location of impacted communities would differ.	Compared to Alternatives B and C, fewer environmental justice residences and communities near the western and southern siting corridors and haul routes would be subject to disproportionately high and adverse effects due to the reduced footprint of the siting corridors. Compared to Alternative D, the number of impacted communities would be similar, but the location of impacted communities would differ.	Compared to all other action alternatives, fewer environmental justice residences and communities would be subject to disproportionately high and adverse effects due to the smallest siting corridor footprint.

Noise

During construction and operation of Alternative B, noise may be a concern to environmental justice populations in the analysis area. Residences and communities closest to project work areas would experience the greatest degree of noise impacts. A noise impact assessment was completed for the project and provides an estimate of cumulative noise levels at identified NSAs (including residences and schools) during project construction and operation (SWCA 2022a). Of the 135 total residential NSAs, a total of 121 occur within identified environmental justice communities. Predicted noise levels were compared against relevant noise criteria, including the EPA's recommended noise standard (L_{dn})[29] of less than 55 dBA for residential land uses. In general, the average person perceives an increase of 3 dBA or less as barely perceptible, an increase of 5 dBA is readily perceptible, an increase of 10 dBA is perceived as a doubling of the sound, and an increase in 20 dBA is perceived as a dramatic change (SWCA 2022a).

The noise impact assessment modeled construction and operation noise levels under "worst case" scenarios that reflected the highest possible noise levels during each phase of the project. Since there are few sources of sound in the area surrounding the siting corridors, existing background noise levels for residential communities surrounding the siting corridors are conservatively assumed to be 19.3 dBA (L_{eq})[30] or 27.9 dBA (L_{dn}) which is considered very quiet and comparable to the sound of rustling leaves or a soft whisper (SWCA 2022a).

Construction noise levels were not modeled for individual NSAs but instead were estimated based on distance from the source of construction noise. Predicted noise levels (L_{eq}) during construction would range from 87 to 92 dBA at 25 feet, 55 to 60 dBA at 1,000 feet, and 41 to 46 dBA at 5,000 feet, depending on the phase of construction and types of equipment being used. Predicted noise levels during construction drop to 29.3 dBA somewhere between 3.8 and 6.8 miles from the siting corridors, depending on the types of equipment being used. In addition, maximum noise levels (L_{eq}) from vehicle traffic on proposed access roads would range from approximately 80 dBA at 50 feet to approximately 50 dBA at 5,000 feet. For the environmental justice populations which intersect or are in proximity (approximately 5,000 feet or less) of the siting corridors or haul routes, this would represent a dramatic change in background noise levels (over 20 dBA above existing background levels [L_{eq}]). Noise impacts from construction of the project would be temporary and intermittent. Construction is transient in nature, lasting approximately 3 to 5 weeks at any given location, and noise levels would vary depending on the activity in progress. Additionally, blasting during construction would be limited to daytime hours (7:00 a.m.–7:00 p.m.) within 3,000 feet of sensitive receptors. MVE's applicant-committed measures 89 to 90 and 95 to 96 would be applied for noise (see Table App4-2i in EIS Appendix 4), which would minimize potential noise impacts to communities in the analysis area.

Operational noise levels were modeled for individual NSAs, which range from approximately 0.25 to 7 miles from the nearest siting corridors. During operation of the project, predicted noise levels (L_{dn}) for residential NSAs within environmental justice communities would range from 28.5 to 48.6 dBA, or an increase of 0.6 to 20.7 dBA above existing background levels. While these operational noise levels are all below the EPA's recommended noise standard (L_{dn}) of 55 dBA for residential land uses, the increased noise levels above existing conditions would still be readily perceptible to most of the environmental justice NSAs. Project-related noise effects would be high and adverse where residents live near the siting corridors and haul routes (during construction), and these effects would be disproportionately borne by environmental justice communities who make up most of the population within affected areas.

[29] Day-night noise level (Ldn) is the A-weighted equivalent sound level for a 24-hour period with an additional 10 dB weighting imposed on the equivalent sound levels occurring during nighttime hours (10:00 p.m.–7:00 a.m.)
[30] Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.

Traffic

As described in Section 3.14 (Transportation) in EIS Appendix 15, impacts to environmental justice communities could occur from Alternative B construction traffic on roads, particularly on primary haul routes (I-84, U.S. 93, ID 24, and ID 25) and other secondary haul routes (see Figure 3.6-2). The proposed haul routes intersect five low-income and minority block groups and two Tribal census tracts (see Figures 3.6-2 and 3.6-3).

Construction-related vehicles would temporarily change traffic patterns on U.S. 93 and ID 24 through increased passenger and commercial trips, temporary lane closures and detours during proposed roadway improvements at siting corridor entrances, and increased congestion and travel times. With the exception of a small 1-mile segment of U.S. 93 (from ID 25 to East 100 North), all other segments of U.S. 93 and ID 24 would maintain a level of service (LOS) of D or better, which Idaho Transportation Department (ITD) considers acceptable for peak hour conditions (see Section 3.14 in EIS Appendix 15). It is unlikely that construction traffic would affect I-84 or other roadways near the I-84 corridor where exiting traffic counts are high. However, short-term delays at intersections along the haul route may occur during turbine component delivery. These impacts are described further in MVE (2023) Appendix K and MVE (2023) Appendix J.

Increased traffic and congestion on U.S. 93, ID 24, and other secondary haul routes would create an inconvenience for local residents and drivers. However, MVE's applicant-committed measures 31 to 43 would be implemented during construction (see Table App4-2e in EIS Appendix 4), which would minimize potential traffic impacts to communities in the analysis area. MVE would consult with local planning authorities regarding increased traffic during construction, and specific issues of concern (e.g., location of school bus routes and stops) would be identified and addressed in the traffic management plan. All communities in the analysis area would have the potential to be adversely affected by increased traffic, particularly along the primary haul routes because they occur on highways and major thoroughfares distributed throughout the analysis area (see Figure 3.6-2). Traffic impacts would be high and adverse for travelers along primary and secondary haul routes, and these effects would be disproportionately borne by environmental justice communities who make up most of the population within the analysis area.

Operation and maintenance of the project would generate an average of 38 trips per day, with most trips being passenger vehicles for operational employees. These additional trips would have no noticeable effect on existing roadways within the analysis area, and existing LOS would remain unchanged.

Dust and Air Pollution

As described in Section 3.2 (Air Quality) in EIS Appendix 15, Alternative B construction and operation activities would produce air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from the siting corridors, delivery truck exhaust, and fugitive dust from soil disturbance and travel on unpaved roads. Project emissions during construction and operation, when added to background pollutant concentrations, are unlikely to violate the NAAQS and the air quality analysis area (approximately 31 miles [50 km] in all directions beyond the siting corridors) would remain in attainment for all criteria pollutants. MVE's applicant-committed measures 113 to 119 would be implemented to further minimize the potential for dust to be generated during construction (see Table App4-2l in EIS Appendix 4). The impacts to air quality from project construction and operation would be minor. Therefore, environmental justice populations would not be disproportionately or adversely affected by dust and air pollution.

Shadow Flicker

Operation of the Alternative B wind turbines would also result in shadow flicker, or the shadows cast by wind turbines' moving blades, which could be a nuisance for residences and other sensitive viewer groups in the analysis area (see Section 3.16.3 [Shadow Flicker] in EIS Appendix 15). Shadow flicker was modeled for all residences and schools, travel routes, and visitor and recreation areas within 2 miles of the turbine siting corridors. Modeling results indicate that, depending on turbine height, between 8 and 10 residences within 2 miles of the turbine siting corridors would experience shadow flicker, and of these, two residences would experience shadow flicker levels that exceed industry standards for avoiding nuisance (> 30 hours per year) (see Section 3.16.3 in EIS Appendix 15). All the residences that would be affected by shadow flicker occur within identified environmental justice communities; therefore, shadow flicker effects would be disproportionately borne by environmental justice communities. MVE's applicant-committed measure 25 (see Table App4-2c in EIS Appendix 4) would ensure that all turbines are set back from residences in accordance with industry standards.

Visual

As described in Section 3.16.1, Alternative B construction would affect the visual character and inherent scenic quality of the analysis area through vegetation removal, fugitive dust generation, the presence and operation of construction equipment, transmission line stringing operations, and material stockpiling. The presence and operation of construction cranes, transmission line stringing operations, and the stockpiling of material resulting from tower base construction would also contribute to overall visual effects, although effects would be limited to the 2-year construction phase. The turbines that would be assembled in the siting corridors during the 2-year construction phase would gradually become visually dominant in the landscape and would be the primary focus of attention for viewers. Visual impacts during construction would be more perceivable in the immediate foreground (0–2 miles) and foreground areas (2–10 miles) and would range from minor to major based on the type of construction activity taking place, time of year, and time of day.

Project operation would affect the visual character and inherent scenic quality of the analysis area due to the visibility of the aboveground components associated with the project. The wind turbines would have the greatest visual effect due to their size and rotational motion and would create a major to moderate degree of visual change when viewed in the immediate foreground and foreground areas. For areas farther removed from the siting corridors (10–30 miles), the degree of visual change would appear unaltered to the casual observer with project elements being visible, but not attracting attention. Other project components such as overhead transmission and collector lines and dirt access roads would be visually subordinate compared to the wind turbines.

Environmental justice populations that occur within the immediate foreground (0–2 miles) include scattered rural residences within low-income and minority communities. Environmental justice populations that occur within the foreground (2–10 miles) include low-income, minority, and Tribal populations within the cities of Shoshone, Hazelton, Paul, Dietrich, and Jerome. These environmental justice populations and resources would experience major to moderate visual changes to landscape character wherever the project turbines are visible. Environmental justice populations within the immediate foreground would experience major visual changes where the landscape would appear to be heavily altered and project elements would dominate the visual setting. Environmental justice populations within the foreground would experience moderate visual changes where the landscape would appear to be moderately altered, and the project elements would begin to dominate the visual setting.

Communities within the immediate foreground and foreground of siting corridors would experience high and adverse visual impacts, and these effects would be disproportionately borne by environmental justice communities who make up most of the population within the affected area.

Dispersed Environmental Justice Populations

Table 3.6-3 provides a summary of impacts to dispersed environmental justice communities across all action alternatives.

Table 3.6-3. Summary of Impacts to Dispersed Environmental Justice Communities

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Geographically dispersed environmental justice populations and associated resources of concern in analysis area	Japanese American and Minidoka-connected communities and Tribes	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
Disproportionate impacts to identified environmental justice communities	The Japanese American and Minidoka-connected communities and Tribes would be subject to disproportionate high and adverse effects from increased noise, increased traffic, changes to the visual character and inherent scenic quality of the analysis area, and other physical or non-physical impacts to cultural resources. The project could also impact culturally important wildlife, vegetation, or waters in a manner that changes subsistence practices and cultural relationships to the wildlife and their habitats and diminishes treaty rights.[31] The impacts to Tribes' treaty rights would be consistent with the impacts described for Alternative B for the affected resources. If project impacts cause a noticeable decline in the Tribes' ability to access, use, or enjoy the resource for its intended purpose,	Relative to Alternative B, visual impacts for Minidoka NHS and WRC would be reduced from major to moderate, and noise and traffic effects would be reduced for Minidoka NHS, but would largely remain for the WRC. Impacts to Tribal treaty rights would be similar in nature to those described for Alternative B but would be proportionally reduced because of the reduced siting corridors. Although the magnitude of potential impacts would be reduced compared to Alternative B, they would not be eliminated, and any adverse effects to Minidoka NHS, Minidoka WRC, or Native American resources of concern would still constitute disproportionately high and adverse impacts to the Japanese American community and Tribes given the importance of setting and feeling to the value of these resources.	Visual, noise, and traffic impacts for Minidoka NHS and WRC would be same as Alternative C. Impacts to Tribal treaty rights would be similar in nature to those described for Alternative B but would be proportionally reduced because of the reduced siting corridors. Although the magnitude of potential impacts would be reduced compared to Alternative B, they would not be eliminated, and disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur.	Relative to Alternatives B, C, and D, visual impacts for Minidoka NHS and WRC would be reduced from major to moderate or minor. Noise and traffic effects for Minidoka NHS and WRC would be the second lowest of all action alternatives. Impacts to Tribal treaty rights would be similar in nature to those described for Alternative B but would be proportionally reduced because of the reduced siting corridors. Although the magnitude of potential impacts would be reduced compared to Alternatives B, C, and D, they would not be eliminated, and disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur.	Visual impacts for Minidoka NHS and WRC would be same as Alternative E, noise effects for Minidoka NHS and WRC would be the lowest of all action alternatives, and traffic effects for Minidoka NHS and WRC would be eliminated. This alternative would result in the least impacts to Tribal treaty rights, proportionally. Although the magnitude of potential impacts would be reduced compared to Alternatives B through E, they would not be eliminated, and disproportionately high and adverse impacts to the Japanese American community and Tribes would still occur.

[31] See Section 3.18.2 (Big Game Habitats and Populations) as well as Sections 3.12.1 (Hunting and Trapping Access and Opportunities), 3.15 (Vegetation), 3.17 (Water and Wetland Resources), and 3.18 (Wildlife) in EIS Appendix 15 for how these resource patterns or availability would be changed by the project.

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
	then this would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their treaty-protected rights.				

Japanese American and Minidoka-Connected Communities

Alternative B impacts to the Japanese American and Minidoka-connected communities would result from project-related effects to resources of concern including Minidoka WRC (intersected by the siting corridors and haul routes) and Minidoka NHS (0.7 mile from the nearest siting corridors and haul route). These communities have stated that the environmental setting and feeling of these resources of concern would be adversely affected by increased noise, shadow flicker (affecting Minidoka WRC only), and changes to the visual character and inherent scenic quality of the analysis area, which in turn would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Members of these communities explained that adverse effects to Minidoka NHS and Minidoka WRC would have the potential to cause psychological harm to their members by perpetuating and reinforcing existing feelings of anger, injustice, distrust, and being dishonored within the community, and by potentially diminishing the ability of the community to benefit from healing rituals and practices centered around Minidoka NHS. Potential impacts associated with increased dust and air pollution would be the same as previously described for low-income and minority populations (minor) and would not result in disproportionate high or adverse effects on the Japanese American community.

NOISE

As described in the affected environment, the NPS modeled existing noise levels for Minidoka NHS to be approximately 32 dBA (NPS 2015). However, because Minidoka NHS and Minidoka WRC are considered sensitive noise receptors, the noise impact assessment performed for the project conservatively assumed existing background noise levels for NSAs within and near to Minidoka NHS and Minidoka WRC to be 19.3 dBA (L_{eq})[32] or 27.9 dBA (L_{dn}), which is considered very quiet and comparable to the sound of rustling leaves or a soft whisper (SWCA 2022a).

Predicted noise levels (L_{eq}) during Alternative B construction would range from 87 to 92 dBA at 25 feet, 55 to 60 dBA at 1,000 feet, and 41 to 46 dBA at 5,000 feet, depending on the phase of construction and types of equipment being used. In addition, maximum noise levels (L_{eq}) from vehicle traffic on proposed access roads would range from approximately 80 dBA at 50 feet to approximately 50 dBA at 5,000 feet. Since Minidoka NHS and a majority of Minidoka WRC are in proximity (approximately 5,000 feet or less) of the siting corridors or haul routes, these noise levels would represent a dramatic change in background noise levels (approximately 20 dBA or more above existing background levels [L_{eq}]). MVE's applicant-committed measures 89 to 90 and 95 to 96 (see Table App4-2i in EIS Appendix 4) would be implemented during construction to minimize potential noise impacts for sensitive receptors in the analysis area.

Of the 135 total NSAs included in the noise impact assessment, 19 NSAs are within Minidoka WRC and five NSAs are within or adjacent (< 0.3 mile) to Minidoka NHS. Operational noise levels (L_{dn}) at NSAs within or near Minidoka NHS range from 32.5 to 40.5 dBA, or 4.6 to 12.5 dBA above existing background levels. Operational noise levels (L_{dn}) at NSAs within Minidoka WRC would range from 31.9 to 44.1 dBA, or 4.0 to 16.2 dBA above existing background levels. While these operational noise levels are all below the EPA's recommended noise standard (L_{dn}) of 55 dBA for residential land uses, the increased noise levels above existing conditions would still be readily perceptible to most of the NSAs. Although these are two different studies, SWCA (2022) modeled noise levels would exceed the existing noise levels modeled by NPS (2015) for Minidoka NHS by approximately 0.5 to 8.5 dBA at two of the NSAs within or near Minidoka NHS.

[32] Equivalent noise level (L_{eq}) is the energy average A-weighted noise level during the measurement period.

Construction and operational noise at Minidoka NHS and Minidoka WRC would result in disproportionately high and adverse effects to the Japanese American community because of the importance of the soundscape to the environmental setting and overall visitor experience of remoteness, isolation, abandonment, reflection, and healing.

TRAFFIC

As previously discussed for low-income, minority, and Tribal populations, Alternative B construction-related vehicles would increase traffic and congestion on haul routes. Although the majority of roads would maintain an acceptable LOS for peak hour conditions, local drivers would still experience it as an inconvenience. Operational traffic would be low (38 trips per day) and is not expected to have a noticeable effect on existing roadways within the analysis area. MVE's applicant-committed measures 31 to 42 would be implemented during construction (see Table App4-2e in EIS Appendix 4), which would minimize potential traffic impacts for motorists in the analysis area.

The Minidoka WRC is intersected by several access roads and a haul route, and Minidoka NHS is approximately 0.7 mile from the nearest haul route. Increased traffic within or near Minidoka NHS and Minidoka WRC would modify the setting and feeling of these resources through increased noise and human activity in the area, which in turn would erode the sense of solitude, remoteness, and abandonment that visitors seek to experience. Increased traffic would result in disproportionately high and adverse effects to the Japanese American and Minidoka-connected communities given the importance of the soundscape to the environmental setting and overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Therefore, the Japanese American and Minidoka-connected communities would experience disproportionately high and adverse effects from traffic during the 2-year construction phase; however, operational traffic would be minor and would not result in disproportionately high and adverse impacts to the Japanese American and Minidoka-connected communities.

SHADOW FLICKER

Operation of the Alternative B wind turbines would also result in shadow flicker, which could be a nuisance for visitors to Minidoka WRC. Shadow flicker was modeled for Minidoka NHS (see Section 3.16 [Visual Resources]); modeling results indicate that portions of Minidoka NHS could experience shadow flicker due to its distance (1.1 miles) from the siting corridors. Also, portions of Minidoka WRC that intersect the turbine siting corridors would experience shadow flicker to varying degrees, depending on proximity to turbines. Shadow flicker would alter the landscape character and environmental setting of portions of Minidoka NHS and Minidoka WRC and would detract from the overall visitor experience at Minidoka WRC by creating a visual distraction and nuisance for those visitors closest to the turbines. The nuisance or distraction of shadow flicker would compromise the ability for visitors to engage in remembrance and healing at the site. Therefore, the Japanese American and Minidoka-connected communities would experience high and adverse effects from shadow flicker within Minidoka NHS and Minidoka WRC.

VISUAL

As previously discussed for low-income, minority, and Tribal populations, Alternative B construction and operation would affect the visual character and inherent scenic quality of the analysis area through vegetation removal, fugitive dust generation, the presence and operation of construction equipment, and material stockpiling during construction, and through the presence and operation of wind turbines and other aboveground infrastructure during project operation. Visual impacts during construction and operation would be greatest in the immediate foreground (0–2 miles) and foreground areas (2–10 miles). MVE's applicant-committed measures 18, 19, and 22 to 25 (see Table App4-2c in EIS Appendix 4) would be implemented to minimize potential visual impacts for surrounding viewers. In addition, several mitigation measures required by BLM policy (D, F, H, and J) would reduce potential visual impacts to surrounding viewers by encouraging the co-location of infrastructure within previously disturbed areas.

Although Minidoka NHS is 1.1 miles from the nearest siting corridor, views of the project from Minidoka NHS would occur within the immediate foreground (0–2 miles) or foreground (2–10 miles) of the siting corridors, depending on the primary viewer direction and focus of attention. Minidoka WRC occurs within both the immediate foreground and foreground of the siting corridors. Within the immediate foreground and foreground, visitors at Minidoka NHS and Minidoka WRC would experience major visual changes where the landscape would appear to be severely altered because of the dominance of the wind turbines, and the project would dominate the field of view and would become the primary focus of visual attention, thus detracting from views of other landscape elements.

A total of 17 KOPs were selected to evaluate site-specific changes in the viewshed from public locations where the project is visible. KOP locations were chosen to be representative of the types of sensitive viewer groups in the visual analysis area (e.g., travelers, visitors, and local residents). Of the 17 total KOPs, three KOPs are located at Minidoka NHS and Minidoka WRC (KOPs 1, 2, and 16). Based on KOP analysis results, these three KOPs associated with the Japanese American and Minidoka-connected communities are among the top KOPs with the most visual impact from the project. Table 3.6-4 summarizes the degree of visual change predicted during project operation at KOPs 1, 2, and 16, as described from the visual analysis presented in Section 3.16 (Visual Resources). Photographs from KOPs 1, 2, and 16 are included in EIS Appendix 5. Several applicant-committed measures would be implemented and incorporated into the final project design to minimize adverse effects to specific KOPs and sensitive viewer groups (see Table App4-2c in EIS Appendix 4).

Table 3.6-4. Environmental Justice Key Observation Points

KOP	Sensitive Viewer Group	Associated Environmental Justice Population	Location Description	Distance Zone	Degree of Visual Change				
					Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
KOP 1	Visitors	Japanese American and Minidoka-connected communities	Minidoka NHS and Minidoka WRC	Immediate Foreground	Major	Moderate	Moderate	Moderate	Moderate
KOP 2	Visitors	Japanese American and Minidoka-connected communities	Minidoka NHS and Minidoka WRC	Foreground*	Major	Major	Major	Minor	Minor
KOP 16	Visitors	Japanese American and Minidoka-connected communities	Minidoka NHS and Minidoka WRC	Foreground*	Major	Moderate	Moderate	Moderate	Moderate
KOP 10	Visitors	Tribes	Wilson Butte Cave	Immediate Foreground	Major	Major	Major	Major	Major

* Although the viewers' primary focus would be in the direction of siting corridors, which are 5.0 to 5.5 miles away (foreground), the peripheral distance to the nearest siting corridors is approximately 1.7 miles (immediate foreground), which may attract attention but would not be the primary focus of attention. The degree of visual change is reflective of the project in the viewers' peripheral vision from the KOP orientation.

Major auditory and visual changes resulting from Alternative B to the landscape character and scenic integrity at Minidoka NHS and Minidoka WRC would result in disproportionately high and adverse effects to the Japanese American and Minidoka-connected communities because of the importance of landscape character and environmental setting on the overall visitor experience at these sites. Major modifications to the landscape character at Minidoka NHS and Minidoka WRC would have a commensurate effect on visitor experience by reducing or eliminating visitors' experience of remoteness, isolation, and abandonment. Without these experiences, the ability for visitors to better understand and connect with the daily lives of those who were incarcerated, and to engage in remembrance and healing would be compromised or eliminated. These visitor experiences are also essential to achieving the purpose of Minidoka NHS and maintaining its significance as a historic site (see Section 3.19 [Minidoka National Historic Site Interpretive Purpose]). For these reasons, the Japanese American community would experience disproportionately high and adverse effects from the degree of visual change in the immediate foreground and foreground.

Native American Tribes

Impacts to Tribes would result from project-related effects to Native American resources of concern. Native American resources of concern could be adversely affected by physical impacts and non-physical impacts such as increased noise and changes to the visual character and inherent scenic quality of the analysis area. Potential impacts associated with increased dust and air pollution would be the same as previously described for non-dispersed environmental justice populations (minor) and would not result in disproportionate high or adverse effects on Tribes.

PHYSICAL IMPACTS

As described in Section 3.5.4 (Physical Impacts), physical impacts to cultural resources and other Native American resources of concern could result from ground disturbance during construction, vibrations from blasting, fugitive dust generation, or range improvement projects that would concentrate cattle travel paths, congregation, and ranging, which could result increased near-surface disturbance and possibly erosion within the boundaries of a cultural resource. MVE's applicant-committed measures 1 to 4, 7, 14, 17, 31, 37, 43, 45, 85 to 96, and 97 to 99 (see EIS Appendix 4) would be implemented during construction to minimize the potential for physical impacts to cultural resources from ground disturbance, fugitive dust, blasting vibrations, or range improvements.

Based on previously recorded cultural resources within the siting corridors, it is estimated that approximately 243 cultural resource sites occur within the siting corridors and therefore may be subject to physical impacts during construction. Of these 243 cultural resources, at least 12 sites contain feature types known to be of potential traditional or religious cultural significance to Tribes. Additional resources of concern for Tribes may be identified throughout the process of Government-to-Government consultation or could be discovered during preconstruction cultural resource surveys or during construction. MVE's applicant-committed measures 97 and 99 (see Table App4-2j in EIS Appendix 4) would require an HPTP be drafted before construction to outline the processes to follow should inadvertent discoveries of cultural resources occur during construction. MVE would coordinate with the Tribes to avoid cultural resources to the extent practicable.

Physical impacts to Native American resources of concern could diminish the integrity of the resource and destroy or alter the characteristics of the resource that are of value to Tribes, thereby reducing the Tribes ability to access, use, and enjoy the resource for its intended subsistence, cultural, or spiritual purpose. These physical effects could also impact culturally important wildlife (including eagles[33]),

[33] During Government-to-Government consultation, the Tribes have requested that all eagles killed by this project be provided to them.

vegetation, or waters in a manner that changes subsistence practices and cultural relationships to the wildlife and their habitats and diminish treaty rights. See Section 3.18.2 (Big Game Habitats and Populations) as well as Sections 3.12.1 (Hunting and Trapping Access and Opportunities), 3.15 (Vegetation), 3.17 (Water and Wetland Resources), and 3.18 (Wildlife) in EIS Appendix 15 for how these resource patterns or availability would be changed by the project. The impacts to Tribes' treaty rights would be consistent with the impacts described for Alternative B for these resources in their respective EIS sections. If physical impacts cause a noticeable decline in the Tribes' ability to access, use, or enjoy the resource for its intended purpose, then this would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their treaty-protected rights. Additionally, Alternative B was sited to avoid physical effects to Wilson Butte Cave, which is a resource of concern to Native American Tribes.

NON-PHYSICAL IMPACTS

As described in Section 3.5.5 (Non-physical Impacts), non-physical visual or noise impacts to cultural resources and other Native American resources of concern could occur where setting, feeling, or association are important aspects of the affected resource. Visual impacts to Native American resources of concern would result from daytime visibility of any project infrastructure or construction equipment, nighttime visibility of project warning lights, and construction and decommissioning light sources. Visual impacts during construction and operation would be greatest for resources within the immediate foreground (0–2 miles) and foreground areas (2–10 miles). MVE's applicant-committed measures 18, 19, 22 and 25 (see Table App4-2c in EIS Appendix 4) would be implemented to minimize potential visual impacts for surrounding viewers. In addition, several mitigation measures required by BLM policy (D, F, H, and J) would reduce potential visual impacts to surrounding viewers by encouraging the co-location of infrastructure within previously disturbed areas.

Noise generated during construction and operation would affect Native American resources of concern where the soundscape is an essential part of the resource's value to Native American communities. Similar to visual impacts, noise impacts would be greatest for resources within the immediate vicinity of the siting corridors and would diminish with distance. Operational noise levels from turbines would be greatest within 1 mile of the siting corridors and could be perceptible up to approximately 0.5 mile from the 230-kV and 500-kV transmission lines and 2.2 miles from the turbine siting corridors (SWCA 2022a: Figure D-2). MVE's applicant-committed measures 89 to 90 and 95 to 96 (see Table App4-2i in EIS Appendix 4) would be implemented during construction to minimize potential noise impacts for sensitive receptors in the analysis area.

Cultural resources of concern for Tribes that are within the viewshed of project infrastructure and are susceptible to visual impacts are analyzed in Section 3.5.5 (Non-physical Impacts) and will be further inventoried and assessed pursuant to the PA (see EIS Appendix 8). Potential noise impacts will also be considered for these resources. Based on initial project scoping and Section 106 consultation, Native American cultural resources of concern that have been identified thus far include sites of traditional or religious cultural significance to Tribes (e.g., Wilson Butte Cave, other caves and buttes, and cultural landscapes). In addition, there are 73 potential Native American resources of concern (i.e., of traditional or religious significance) documented within the visual component of the non-physical APE (the viewshed within the 20-mile distance zone from project siting corridors for turbine and the 500-kV transmission line) that are potentially susceptible to visual impacts (see Section 3.5 [Cultural Resources]). However, additional concerns of Tribes may extend to natural resources, as described in Section 3.5.

Wilson Butte Cave occurs within the immediate foreground (0–2 miles) of the siting corridors and would therefore be subject to major visual and noise impacts during construction and operation (see KOP 10 in Table 3.6-4). Additional Native American resources of concern may exist within the immediate foreground or foreground; however, site-specific information is not available at this time. Major visual changes and noise impacts near Wilson Butte Cave or other resources of concern within the immediate foreground or foreground would result in disproportionately high and adverse effects to Tribes by diminishing the integrity and value of those resources to the Tribes and reducing the Tribes' ability to use and enjoy those resources for their intended cultural or spiritual use. If non-physical impacts cause a noticeable decline in the Tribes' ability to use or enjoy the resource for its intended purpose, then this would be considered a high, disproportionate, and adverse effect given the importance and sacredness of these resources to Tribes. AIRFA protections and EO 13007 guidance for Native American sites of religious importance, and Treaty Right concerns, would be addressed through Government-to-Government consultation between the BLM and federally recognized Tribes.

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (Table 3.6-5; see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to environmental justice communities under Alternative B. Although these measures are not included as part of MVE's Proposed Action (Alternative B), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for environmental justice communities are summarized in Table 3.6-5 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.6-5. Mitigation for Environmental Justice Communities

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1–4	D	e
7	F	g–l
14	H	gg
17	J	rr
18–19	–	ss
22–25	–	jjj
31-43	–	qqq
45	–	rrr
85-99	–	sss
113-119	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of additional project-specific mitigation measures e, g, h, i, j, k, and l under Alternative B would further minimize the potential for physical impacts to Native American resources of concern resulting from fugitive dust. Implementation of additional project-specific mitigation measures gg, rr, ss, and jjj under Alternative B would further minimize potential physical and non-physical impacts to Native American resources of concern by avoiding ground disturbance near sensitive areas and ensuring compliance with the Section 106 process. Implementation of additional project-specific mitigation measures qqq, rrr, and sss under Alternative B would further reduce or avoid visual impacts to all environmental justice populations.

3.6.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Low-Income, Minority, and Tribal Populations

The siting corridors for Alternative C would intersect the same minority communities as Alternative B, but compared to Alternative B, Alternative C would intersect one fewer low-income and Tribal census tract in the southwestern portion of the siting corridors where I-84 and U.S. 93 intersect (see Table 3.6-2 and Figure 3.6-3). The reduced footprint of the siting corridors would reduce potential visual, noise, dust, and traffic effects for all low-income, minority, and Tribal communities in the western portion of the siting corridors. Specifically, environmental justice communities near the western siting corridors and in the major cities of Shoshone, Jerome, and Twin Falls would experience the greatest improvement in terms of reduced visual, noise, dust, and traffic impacts, and all environmental justice communities west of U.S. 93 would also have a reduced potential for visual and noise impacts due to the turbines being farther away.

Alternative C would implement the same applicant-committed measures and would require the same BLM policy mitigation measures and project-specific additional mitigation measures as Alternative B, which would similarly minimize the potential effects to low-income, minority, and Tribal populations.

Dispersed Environmental Justice Populations

Japanese American and Minidoka-Connected Communities

As described in Section 2.5 (Alternative C [Reduced Western Corridors]), Alternative C reduces the amount of siting corridors in Minidoka WRC that would be nearest to and in the most prominent viewing directions of Minidoka NHS, which would minimize and avoid visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC and resulting effects on the overall visitor experience (see Table 3.6-2). Compared to Alternative B, the degree of visual change for viewers at Minidoka NHS and Minidoka WRC KOPs (see KOPs 1, 2, and 16 in Table 3.6-4) would be reduced from major to moderate. Given the importance of environmental setting and feeling to the visitor experience of remoteness, isolation, abandonment, reflection, and healing at these sites, any adverse effects to the baseline soundscape or landscape would constitute a disproportionately high and adverse effect on the Japanese American community.

Native American Tribes

The reduced footprint of siting corridors under Alternative C would reduce the potential for physical and non-physical impacts to Native American resources of concern relative to Alternative B and resulting effects on the ability for Tribes to use and enjoy these resources for their intended purposes or in accordance with the Tribes' treaty-protected rights (see Table 3.6-3). The impacts to Tribes' treaty rights would be consistent with the impacts described for Alternative C for culturally important resources (e.g., wildlife, vegetation, and waters) in their respective EIS sections and described in Section 3.6.1.2.2. The potential for reduced physical and non-physical impacts would be greatest for any Native American resources of concern in the western corridors, specifically. The degree of visual change near Wilson Butte Cave (see KOP 10 in Table 3.6-4) would still be major and would still constitute a disproportionately high and adverse effect for Tribes. Although this alternative would likely reduce the number of Native American resources of concern potentially affected, and the magnitude of potential effects for some resources of concern, the potential for adverse effects would not be eliminated altogether. Given the importance of setting and feeling to many Native American resources, any adverse effects to the baseline soundscape, landscape, or physical sites themselves would constitute a disproportionately high and adverse effect on Tribes. Similarly, any impacts that cause a noticeable decline in the Tribes' ability to access, use, or enjoy culturally important resources for their intended purpose would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their Treaty-protected rights.

3.6.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Low-Income, Minority, and Tribal Populations

The siting corridors for Alternative D would intersect fewer low-income, minority, and Tribal census tracts and block groups compared to Alternatives B, C, and E (see Table 3.6-2). Compared to Alternatives B and C, the reduced footprint of the siting corridors would reduce potential visual, noise, dust, and traffic effects for all low-income, minority, and Tribal communities in the western and eastern portions of the siting corridors[34]. Specifically, environmental justice communities near the western siting corridors (e.g., cities of Shoshone, Jerome, and Twin Falls) and eastern siting corridors (e.g., towns of Paul and Heyburn and city of Burley) would experience the greatest improvement in terms of reduced visual, noise, dust, and traffic impacts, and all environmental justice communities west of U.S. 93 or east of 750 West Road/South 300 East would have a reduced potential for visual and noise impacts due to the turbines being farther away.

Alternative D would implement the same applicant-committed measures and would require the same BLM policy mitigation measures and project-specific additional mitigation measures as Alternative B, which would similarly minimize the potential effects to low-income, minority, and Tribal populations.

Dispersed Environmental Justice Populations

Japanese American and Minidoka-Connected Communities

The magnitude of potential visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC, and resulting effects on the overall visitor experience, would be the same as Alternative C (see Table 3.6-4).

Alternative D would implement the same applicant-committed measures and would require the same BLM policy mitigation measures and project-specific additional mitigation measures as Alternative B, which would similarly minimize potential effects to the Japanese American community.

Native American Tribes

The reduced footprint of siting corridors under Alternative D would reduce the potential for physical and non-physical impacts to Native American resources of concern relative to Alternatives B and C and reduce the resulting effects on the ability for Tribes to use and enjoy these resources for their intended purposes or in accordance with the Tribes' treaty rights (see Table 3.6-3). The impacts to Tribes' treaty rights would be consistent with the impacts described for Alternative D for culturally important resources (e.g., wildlife, vegetation, and waters) in their respective EIS sections and described in Section 3.6.1.2.2. Alternative D would reduce potential effects to Native American resources of concern in the western and eastern siting corridors.

[34] Specifically, environmental justice communities near the western siting corridors (e.g., cities of Shoshone, Jerome, and Twin Falls) and eastern siting corridors (e.g., towns of Paul and, Heyburn and , and city of Burley) would experience the greatest improvement in terms of reduced visual, noise, dust, and traffic impacts, and all environmental justice communities west of U.S. 93 or east of 750 West Road/South 300 East would have a reduced potential for visual and noise impacts due to the turbines being farther away.

Under Alternative D, the degree of visual change near Wilson Butte Cave (see KOP 10 in Table 3.6-4) would still be major and would still constitute a high and adverse effect for Tribes. Given the importance of setting and feeling to many Native American resources, any adverse effects to the baseline soundscape, landscape, or physical sites themselves would constitute a disproportionately high and adverse effect on Tribes. Similarly, any impacts that cause a noticeable decline in the Tribes' ability to access, use, or enjoy culturally important resources for their intended purpose would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their treaty-protected rights.

3.6.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Low-Income, Minority, and Tribal Populations

The types of impacts to low-income, minority, and Tribal communities would be the same in Alternative E as Alternatives B and C, but the potential magnitude of impacts would be reduced for communities and residences in both the western and southern siting corridors (see Table 3.6-2).[35] Fewer environmental justice residences and communities would be subject to disproportionately high and adverse effects compared to Alternatives B and C.

Compared to Alternative D, the magnitude of potential impacts would be reduced for residences and communities in the southern siting corridors but would be increased for residences and communities in the eastern siting corridors. Due to the similar sizing of the siting corridors under Alternatives D and E, the number of environmental justice residences and communities that would be subject to disproportionately high and adverse effects would be similar between these two alternatives, but the locations of affected communities would differ.

Dispersed Environmental Justice Populations

Japanese American and Minidoka-Connected Communities

Alternative E would completely avoid any development within Minidoka WRC and would reduce the potential for visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC. Compared to Alternatives B, C, and D, the degree of visual changes for viewers at Minidoka NHS and Minidoka WRC would be reduced from major to moderate or minor for some or all KOPs (see Table 3.6-4). Construction noise would be largely imperceptible within both Minidoka NHS and WRC, except for blasting noise, and operational noise levels would be the second lowest of all action alternatives. In addition, there would be no shadow flicker effects in Minidoka NHS or WRC. Although this alternative would minimize the potential for adverse visual, noise, and traffic impacts compared to Alternatives B, C, and D, they would not be eliminated altogether. Given the importance of environmental setting and feeling to the visitor experience of remoteness, isolation, abandonment, reflection, and healing at these sites, any adverse effects to the baseline soundscape or landscape would constitute a disproportionately high and adverse effect on the Japanese American community.

Native American Tribes

Alternative E would reduce potential effects to Native American resources of concern in the southern corridors. The degree of visual change near Wilson Butte Cave (see KOP 10 in Table 3.6-4) would still be

[35] In addition to the western communities and residences described under Alternative C, scattered residences near the southern siting corridors and the town of Hazelton would also experience reduced visual, noise, and traffic impacts, and all environmental justice communities south of I-84 would also have a reduced potential for visual and noise impacts due to the turbines being farther away.

major and would still constitute a high and adverse effect for Tribes. The impacts to Tribes' treaty rights would be consistent with the impacts described for Alternative E for culturally important resources (e.g., wildlife, vegetation, and waters) in their respective EIS sections and described in Section 3.6.1.2.2.

Potential impacts to Tribes would also be the same as Alternative C, and while the smaller footprint of siting corridors would reduce the potential for Native American resources of concern to be impacted, it would not eliminate the potential for adverse effects altogether. Given the importance of setting and feeling to many Native American resources, any adverse effects to the baseline soundscape, landscape, or physical sites themselves would constitute a disproportionately high and adverse effect on Tribes. Similarly, any impacts that cause a noticeable decline in the Tribes' ability to access, use, or enjoy culturally important resources for their intended purpose would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their treaty-protected rights.

3.6.1.2.6 PREFERRED ALTERNATIVE

Low-Income, Minority, and Tribal Populations

Compared to Alternatives B and C, the magnitude of potential impacts would be reduced for residences near the western and southern siting corridors and haul routes. Compared to Alternative D, the magnitude of potential impacts would be reduced for residences and communities in the southern siting corridors but would be increased for residences and communities in the eastern siting corridors. Compared to Alternative E, the magnitude of potential impacts would be slightly reduced for some residences near the central siting corridors where the footprint is smaller.

The types of impacts to low-income, minority, and Tribal communities would be the same as described for all other action alternatives, but the Preferred Alternative would reduce the potential magnitude of impacts for communities and residences to the greatest extent compared to all other action alternatives. Although project-related effects would still be disproportionately borne by environmental justice communities, fewer environmental justice residences and communities would be subject to disproportionately high and adverse effects compared to all other action alternatives due to the smallest siting corridor footprint.

Dispersed Environmental Justice Populations

Japanese American and Minidoka-Connected Communities

The Preferred Alternative has the smallest siting corridor footprint of all action alternatives and eliminates all but one string of turbines from the immediate foreground and foreground of Minidoka NHS in order to further avoid and minimize potential impacts to the setting and feeling of Minidoka NHS. The one string of turbines that remains within the foreground is located approximately 9.5 miles from the Minidoka NHS Visitor Center and is obstructed (when viewed from KOPs) by existing infrastructure on adjacent farmland. The siting corridors for the Preferred Alternative were also adjusted to maximize the number of turbines that would be hidden or mixed in with existing obstructions from Minidoka-related KOPs 1, 2, and 16.

Compared to all other action alternatives, the Preferred Alternative would reduce the potential for visual and noise effects and eliminate traffic effects to Minidoka NHS and Minidoka WRC and resulting effects on the overall visitor experience to the greatest degree. Compared to Alternatives B, C, and D, the degree of visual changes for viewers at Minidoka NHS and Minidoka WRC would be reduced from major to moderate or minor for some or all viewers (see Table 3.6-4), and the potential for noise effects would be further reduced relative to all action alternatives due to the elimination of siting corridors from the immediate foreground and foreground of the Minidoka NHS. Construction noise would be largely imperceptible within both Minidoka NHS and WRC, except for blasting noise, and operational noise levels would be the lowest of all action alternatives. In addition, there would be no traffic effects due to the absence of any access routes intersecting Minidoka NHS or WRC, and there would be no shadow flicker effects in Minidoka NHS or WRC. Although this alternative would minimize the potential for adverse visual, noise, and traffic impacts to the greatest degree of all action alternatives, they would not be eliminated altogether. Given the importance of environmental setting and feeling to the visitor experience of remoteness, isolation, abandonment, reflection, and healing at these sites, any adverse effects to the baseline landscape would constitute a disproportionately high and adverse effect on the Japanese American community.

Native American Tribes

Of all the action alternatives, the Preferred Alternative has the smallest footprint and would therefore have the lowest likelihood to impact Native American resources of concern and resulting effects on the ability for Tribes to use and enjoy these resources for their intended purposes or in accordance with the Tribes' treaty-protected rights. The impacts to Tribes' treaty rights would be consistent with the impacts described for Preferred Alternative for culturally important resources (e.g., wildlife, vegetation, and waters) in their respective EIS sections and described in Section 3.6.1.2.2. The potential for reduced physical and non-physical impacts would be greatest for any Native American resources of concern in the western and south-central corridors relative to other action alternatives. The degree of visual change near Wilson Butte Cave (see KOP 10 in Table 3.6-4) would still be major and would still constitute a high and adverse effect for Tribes. Given the importance of setting and feeling to many Native American resources, any adverse effects to the baseline soundscape, landscape, or physical sites themselves would constitute a disproportionately high and adverse effect on Tribes. Similarly, any impacts that cause a noticeable decline in the Tribes' ability to access, use, or enjoy culturally important resources for their intended purpose would be considered a high and adverse disproportionate effect given the importance and sacredness of these resources to Tribes and their treaty-protected rights.

3.6.1.2.7 CUMULATIVE IMPACTS

Low-Income, Minority, and Tribal Populations

Reasonably foreseeable transportation, electrical infrastructure, and wind and solar development projects would affect low-income and minority populations in the analysis area through increased local and regional jobs and community infrastructure, and increased traffic, noise, dust, odor, light pollution, and visual effects. The intensity of impacts would vary depending on the proximity of planned actions to low-income and minority populations. The Taurus Wind Project, WEC, and SWIP-North (see details in Section 3.1.1 [Existing and Future Trends and Actions]) would have the greatest potential impacts to low-income and minority communities as these are large infrastructure projects that intersect environmental justice block groups. When combined with the effects of any of the action alternatives, there is potential for cumulative impacts on environmental justice communities to be high, disproportionate, and adverse, particularly if construction of multiple projects occurred at the same time.

Future climate change–related effects and associated risks to human health and safety (e.g., wildfires and extreme heat events) would be regional in nature but may disproportionately affect low-income and minority populations in the analysis area who are already socially vulnerable and have a lower capacity to prepare for, cope with, and recover from climate change impacts (EPA 2016, 2021). As described in Section 3.4 (Climate and Greenhouse Gases) in EIS Appendix 15, the project would generate energy from a renewable resource and would result in substantially fewer GHG emissions than if the same amount of energy were generated by fossil fuels. Avoided GHG emissions from the project would incrementally contribute to the minimization of future projected climate change-related effects, which would benefit low-income and minority populations in the analysis area. While all action alternatives would result in avoided GHG emissions and associated climate change benefits, Alternative B would result in the greatest amount of avoided GHG emissions, and Alternative D would result in the least amount.

Dispersed Environmental Justice Populations

Japanese American and Minidoka-Connected Communities

Reasonably foreseeable transportation, electrical infrastructure, and wind and solar development projects would adversely affect the Japanese American community through increased traffic, noise, dust, odor, light pollution, and visual effects on the setting and feeling of Minidoka NHS and Minidoka WRC. The environmental setting and feeling of these resources of concern would be adversely affected by increased noise, shadow flicker, and changes to the visual character and inherent scenic quality of the analysis area, which in turn would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. The intensity of impacts would vary depending on the proximity of planned actions to Minidoka NHS and Minidoka WRC. WEC and SWIP-North would have the greatest potential impacts as these are large infrastructure projects that intersect or are within proximity to Minidoka NHS and Minidoka WRC. Disproportionately high and adverse effects of any of the action alternatives on the Japanese American community would be further exacerbated by reasonably foreseeable infrastructure development occurring within or near to Minidoka NHS and Minidoka WRC, particularly if construction of multiple projects occurs at the same time. The Taurus Wind Project, WEC, and SWIP-North would result in cumulative visual impacts to Minidoka NHS and Minidoka WRC when combined with the action alternatives.

Since the Japanese American community has repeatedly expressed its concerns over the effects of development projects on Minidoka NHS and Minidoka WRC, any future proposals for development in the area would be seen as an affront to their community and a continuation of the injustice that Minidoka NHS represents. Any cumulative adverse impacts to Minidoka NHS and Minidoka WRC would therefore have the potential to cause psychological harm to members of the Japanese American community by perpetuating and reinforcing existing feelings of injustice, distrust, being dishonored, betrayal, resentment, and anger at the desecration of the site and their families' and community's historical and continued injustice and by diminishing the ability of the community to benefit from healing rituals and practices centered around Minidoka NHS. Cumulative adverse effects of reasonably foreseeable development projects on the Minidoka NHS and Minidoka WRC experience or to the psychological well-being of the Japanese American and Minidoka-connected communities themselves would also diminish the ability to include Japanese American and AANHPI-centered stories in "America's changing commemorative landscape" (see Section 3.6.1.1.1).

Native American Tribes

As described in Section 3.5.1 (Native American Resources) and in EIS Appendix 9, existing and future trends and actions which have, and would continue to impact Native American resources of concern include agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. These existing and future trends and actions have or would result in potential adverse effects to the setting and feeling of the Native American resources of concern and resulting effects on the ability for Tribes to use and enjoy these resources for their intended purposes or in accordance with the Tribes' treaty-protected rights. The physical and non-physical impacts of the action alternatives would be additive to the physical and non-physical impacts of existing and future actions where they occur to the same cultural resources, particularly if construction of multiple projects occurred at the same time. The Taurus Wind Project, proposed solar facilities, WEC, and SWIP-North would result in cumulative visual impacts to cultural resources when combined with the action alternatives. Future trends and actions on federal lands, under federal funding or under federal permitting, would be subject to cultural resources identification and assessment of effects to cultural resources in compliance with ARPA and NHPA Section 106, which would require avoidance, minimization, and mitigation of adverse effects to cultural resources.

3.6.1.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

There would be irretrievable effects to low-income and minority populations and dispersed environmental justice populations throughout the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 50 years for vegetation to reestablish after final reclamation and for the project footprint to no longer be visible in the immediate foreground (0–2 miles); see Section 3.16 (Visual Resources). Potential impacts to low-income and minority populations would consist of short-term effects from increased noise, increased traffic, increased dust and air pollution and long-term effects from shadow flicker, and changes to the visual character of the analysis area. Japanese American communities and Tribes would be subject to disproportionately high and adverse long-term irretrievable effects from increased noise, changes to the visual character and inherent scenic quality of the analysis area, and non-physical impacts to cultural resources.

As described in Section 3.5 (Cultural Resources), physical effects to cultural resources would be irreversible; therefore, irreversible effects to Tribes could also occur if cultural resources are not avoided.

3.6.1.4 Compensatory Mitigation

3.6.1.4.1 DISPERSED ENVIRONMENTAL JUSTICE POPULATIONS

Japanese American and Minidoka-Connected Communities

Even with the implementation of the avoidance, minimization (through alternatives development and removing turbine corridors closest to Minidoka NHS), and mitigation measures (see EIS Appendix 4), residual impacts to the Japanese American and Minidoka-connected communities would still occur and require compensatory mitigation. Please refer to measure VII in Table App4-5 and the Mitigation Framework for Key Resources and Values Associated with Minidoka NHS section in EIS Appendix 4 for more information.

Implementation of compensatory mitigation measure VII would not directly reduce any project-related effects but would aim to compensate for project-related effects indirectly by funding projects that are recommended by a Minidoka NHS stakeholder committee, including members of the Japanese American and Minidoka-connected communities. Compensatory mitigation measure VII for the Minidoka NHS could also serve as compensatory mitigation for Japanese American and Minidoka-connected communities related to impacts to Minidoka NHS and Minidoka WRC. The BLM and the Office of Collaborative Action and Dispute Resolution have implemented proactive approaches to solicit input on the EIS from members of the Japanese American and Minidoka-connected communities, including soliciting their input on potential compensatory mitigation measures; this process is considered ongoing. Based on public comments and stakeholder interviews, the BLM understands that most, if not all, members of the Japanese American and Minidoka-connected communities do not believe it is possible to mitigate for impacts to Minidoka NHS and WRC given the sacredness of the site (see Table A-1 and A-2 in EIS Appendix 14), and that complete avoidance of impacts is their preferred resolution.

Native American Tribes

Even with the implementation of the avoidance, minimization, and mitigation measures (see EIS Appendix 4), residual impacts to Tribes could still occur and may require compensatory mitigation. The following compensatory mitigation measure could be applied to any action alternative if the BLM determines it is warranted (see EIS Appendix 4):

- **Measure VI:** Through ongoing Government-to-Government consultation, the BLM would continue soliciting input from the Shoshone-Bannock Tribes and Shoshone-Paiute Tribes and would apply that input to avoid, minimize, and mitigate project impacts to Native American Tribes. This consultation would include soliciting input from Native American Tribes on compensatory mitigation plans for which the BLM has included compensatory mitigation frameworks in EIS Appendix 4.

Implementation of this mitigation measure would aim to compensate for project-related effects either directly or indirectly, by selecting and implementing avoidance, minimization, and mitigation measures based on input from the BLM's consultation with affected Tribes.

As described in Section 3.5 (Cultural Resources), additional measures to avoid, minimize, or mitigate physical and non-physical impacts to cultural resources would be developed and implemented under the HPMP and HPTPs as part of the project's PA (see EIS Appendix 8). The BLM will also continue to solicit input from Tribes regarding potential mitigation measures for adverse effects to facilitate collaborative decision making throughout Section 106 consultation and Government-to-Government consultation on the project.

3.6.2 Community Services, Employment, and Housing Availability

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.6.3 Local and Regional Economy

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.6.4 Residential Property Values

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.7 FIRE AND FUELS MANAGEMENT

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.8 LAND USE AND REALTY

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.9 LIVESTOCK GRAZING

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.10 PALEONTOLOGICAL RESOURCES

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.11 POLLINATORS AND INSECTS

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.12 RECREATION

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.13 SOILS

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.14 TRANSPORTATION

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.15 VEGETATION

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.16 VISUAL RESOURCES

3.16.1 Landscape Character and Scenic Quality

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.16-1.

Table 3.16-1. Analysis Approach for Landscape Character and Scenic Quality

Issue Analyzed in Detail	How would the introduction of project components impact sensitive viewing platforms (i.e., KOPs) and the existing landscape character and scenic quality?
Analysis Area	The turbine siting corridors plus a 30-mile buffer (Figure 3.16-1). This area was chosen based on the project components, the existing landscape characteristics, and visibility of project elements, and is where potential visual effects from the project may be discerned by the casual viewer.
Indicators	Change in landscape character and associated scenic quality ratings for scenic quality rating units (SQRUs). Area in which the project would be visible. Contrast perceived by viewers when the project is viewed from KOPs. *Scenic quality ratings* are designations of the relative scenic quality of an area based on an evaluation of landform, vegetation, water, color, adjacent scenery, scarcity, and cultural (humanmade) modifications; "A" is the highest rating (for the highest quality), "B" is a moderate rating, and "C" is the lowest rating. *Key observation points* (i.e., KOPs) are viewpoints where there is public sensitivity to visual change (BLM 1986a). The *degree of visual change* describes the level of impact and ranges from none (where changes are barely perceptible or there is no change to scenic quality) to major (where changes are dominant and the landscape is highly altered) and is described further in Table 3.16-2.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Described in section text.
Assumptions or Approach	A viewshed analysis was developed for the analysis area to illustrate where, in the surrounding landscape, the project (specifically the wind turbines) would be visible based on the minimum turbine height (545 feet, 3 MW) and maximum turbine height (740 feet, 6 MW) (see Figure 3.5-2 and additional viewshed mapping in Appendix A of SWCA [2023]). The viewshed analysis used GIS to model the approximate heights (base to blade tip) and approximate locations of turbines within the siting corridors and incorporates those features into the existing landform using digital elevation models to illustrate the areas from which the turbines could be visible within the landscape. The model does not account for atmospheric conditions, lighting conditions, time of year, vegetation, existing structures, and other landscape elements that could obstruct views. The viewshed analysis was used to identify KOPs that represent common or sensitive locations from which the turbines could be viewed or perceived (see SWCA [2023] Appendix A). The following assumptions have been included as part of the analysis of visual resources: • Visibility of project components was based on the tallest visible proposed project feature. • The SFO *Monument Resource Management Plan* (BLM 1986b), as amended, does not establish VRM classes or associated management objectives for BLM public lands in the siting corridors; for this reason, conformance with BLM VRM objectives was not determined in this analysis. • The *Management Plan for Craters of the Moon National Monument and Preserve (Monument Management Plan)* designated VRM Class 1 and 2 areas within the Monument and Preserve (BLM and NPS 2007). This process included an evaluation of scenic quality and an identification of viewsheds and KOPs for visitors to experience the Monument's "weird and scenic landscape peculiar to itself" (BLM and NPS 2007). VRM class objectives established for the Monument and Preserve limit any type of development within the area focusing on preservation and retention of the existing character of the landscape and minimizing any evidence of management activities. The characteristic values of areas designated Class I are especially critical; this classification is only given to ACECs, wilderness and wilderness study areas, wild and scenic rivers or other especially unique areas. However, these class management objectives are not applicable to the project because installation of project components would not occur on these lands. The assessment of the visual environment and the impacts to it involved the following three steps: 1. Describe existing scenic quality of the analysis area. 2. Identify and describe sensitive views for use as KOPs from where the project elements may be visible. 3. Use contrast rating worksheets to characterize visual impacts using the criteria in Table 3.16-2.

	The analytical process used for assessing the visual environment and the impacts to it is detailed in the visual resources technical report (SWCA 2024) and includes a methodology crosswalk (Appendix E in SWCA [2024]) between the BLM's contrast rating system and *Wind Turbine Visibility and Visual Impact Thresholds in Western Landscapes*, a study prepared by the Argonne National Laboratory (Argonne) (Sullivan et al. 2012).

Table 3.16-2. Criteria for Assessing Level of Impacts on Visual Resources

Degree of Visual Change	Change to Landscape Character and Scenic Quality	Contrast Perceived by Viewers from Key Observation Points Considering Environmental Factors
None	Landscape is unaltered, and/or project elements would not attract attention. Landscape character is intact with only minor, if any, humanmade modifications. No change in scenic quality rating. Visibility beyond 20 miles is influenced by atmospheric conditions.	Project elements would not be visually evident (no contrast).
Minor	Landscape would appear slightly altered. Humanmade modifications may be present but repeat the form, line, color, texture, and pattern so completely, and at such scale, that they are not evident. Project elements would introduce new form, line, color, texture, or scale elements but would be visually subordinate. There would be a negative change in scenic quality rating of 0.5 from existing conditions from humanmade modifications or adjacent scenery rating. The proportion of visible acres within the distance zone is between 71% and 80%.	Project elements would create weak contrast compared with other features in the landscape when viewed.
Moderate	Landscape would appear moderately altered, and project elements would begin to dominate the visual setting. Humanmade modifications would begin to dominate the landscape character being viewed. Project elements would introduce form, line, color, texture, or scale not common in the landscape and would be visually prominent in the landscape. There would be a negative change in scenic quality rating of 1.0 from existing conditions from humanmade modifications or adjacent scenery rating. The proportion of visible acres within the distance zone is between 81% and 90%.	Landscape when viewed appears moderately altered. Project elements would be visually prominent in the landscape and would create moderate contrast compared with other features in the landscape when viewed.
Major	Landscape would appear heavily altered, and project elements would dominate the visual setting. Humanmade modifications strongly dominate the landscape character being viewed. Project elements would be out of scale or contains details that are out of character with natural landscape as viewed in the immediate foreground and foreground. There would be a negative change in scenic quality rating of 1.5 or more from existing conditions from humanmade modifications or adjacent scenery rating. The proportion of visible acres within the distance zone is between 91% and 100%.	Landscape when viewed appears heavily altered. Project elements would introduce elements and/or patterns that are uncommon or not found in the landscape and create disharmony and strong contrast when viewed.

3.16.1.1 Affected Environment[36]

The analysis area is within the Snake River Plain section of the Columbia Plateau physiographic region, which is characterized by a volcanic plateau with sediment deposits as a result of the Snake River floodplain (Fenneman 1931). The valley and plain landscapes of the analysis area are dominated by sagebrush steppe but also include irrigated agriculture and development (McGrath et al. 2002). The topography of the analysis area is relatively flat, with elevations ranging from approximately 3,200 feet to approximately 5,900 feet north of the siting corridors.

The existing visual conditions (i.e., values) that relate to landscape components, both natural and humanmade, contribute to the overall visual character associated with an area of land and are expressed through the BLM VRI process. The information collected during the VRI process provides descriptions and analysis of the landscape and viewer sensitivity associated with a project and is broken down into three categories: scenic quality, visual sensitivity, and distance zones (BLM 1986a). The VRI process and components, including the combined VRI, are presented in Figures 3.16-1, 3.16-2, 3.16-3, and 3.16-4 and described in SWCA (2024). Scenic quality ratings of the analysis area are shown in Figure 3.16-1 (see additional details in SWCA [2024]).

The relative scenic quality (A, B, or C) was assigned to landscape units, or SQRUs, in the analysis area by rating the scenic quality evaluation key factors of landform, vegetation, water, color, adjacent scenery, scarcity, and cultural (humanmade) modifications (BLM 1986c). Areas with a scenic quality rating of A (areas of greater visual variety based on the seven factors described above) are in the northeastern and eastern portions of the analysis area, and areas with a rating of B (lesser visual variety than scenic quality A landscapes) are in the northern and southeastern portions of the analysis area. The siting corridors are in an area with a scenic quality rating of C (lesser visual variety than scenic quality B landscapes). Common traits for the siting corridors include a generally flat plain, with a subtle slope and soft undulations from north to south with broad, distant views of surrounding mountain ranges. Vegetation is a mix of sagebrush and low grasses and also contains developed agricultural fields and domestic vegetation species, which add seasonal color and texture variety throughout. The siting corridors contain a mix of urban development, agricultural development, transmission lines, substations, and farming infrastructure, which, when combined, add discordant elements within the natural landscape. The eastern portion of the siting corridors is characterized by rock outcroppings and buttes, which are distinctive in this area.

[36] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

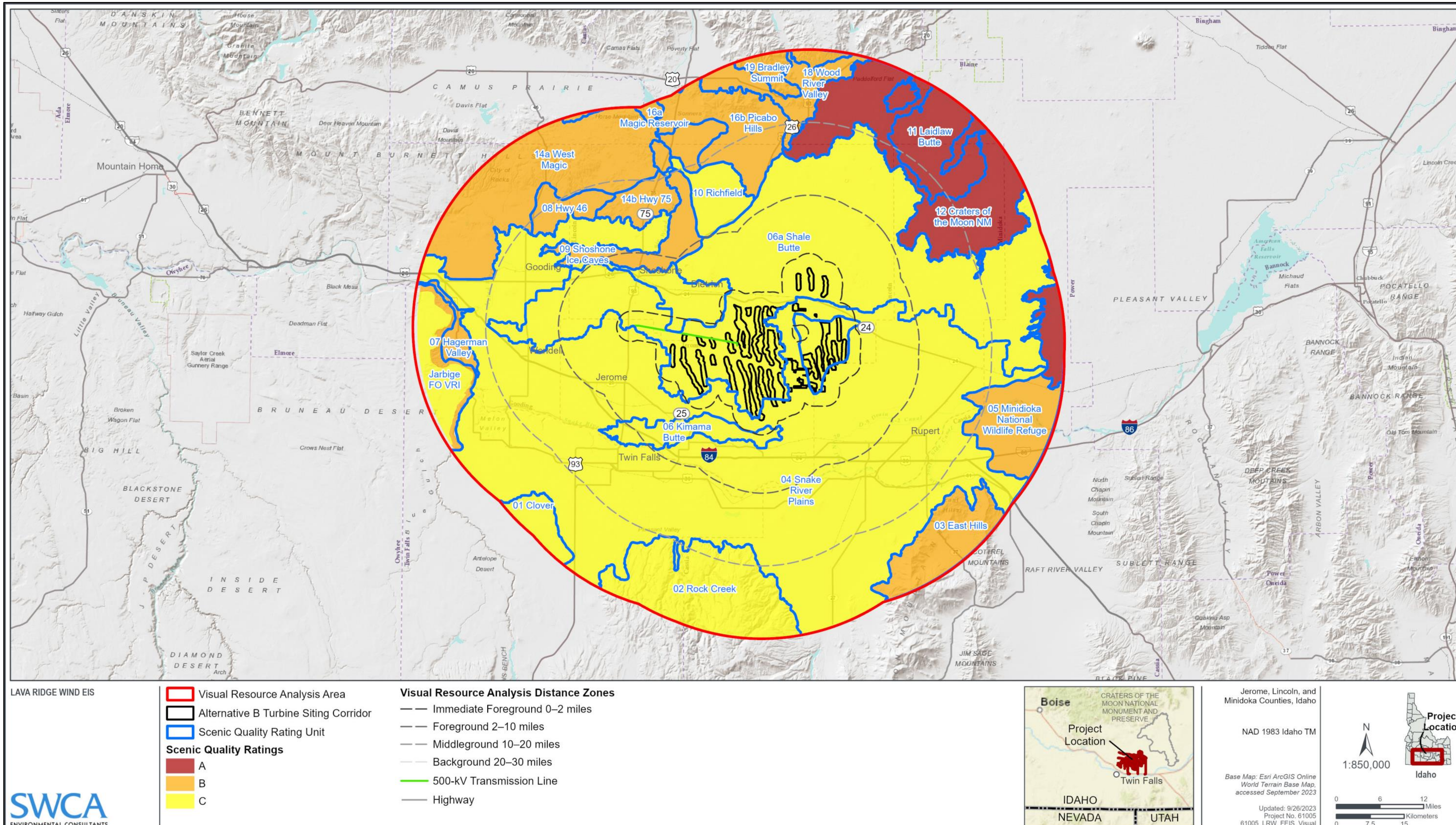

Figure 3.16-1. Scenic quality ratings in the visual resource analysis area.

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The siting corridors are in an area of moderate sensitivity. Figure 3.16-2 illustrates the visual sensitivity ratings for the analysis area (see additional details in SWCA [2024]).

The identified KOPs in the analysis area are described in Table 3.16-3. KOPs are locations where the public could see the project both from a stationary (e.g., residential area) or a linear (e.g., major roadway) location. For additional detail regarding how KOPs are defined, see SWCA (2024).

Table 3.16-3. Key Observation Points in the Visual Resource Analysis Area

KOP Number	KOP Name	Sensitive Viewer Group	Distance Zone Location of KOP to Nearest Turbine Siting Corridor
1	Minidoka NHS – Visitor Center 10:05am	Visitors†	Immediate foreground
1	Minidoka NHS – Visitor Center 3:55pm	Visitors†	Immediate foreground
2	Minidoka NHS – Block 22 Barracks 7:50am	Visitors†	Immediate foreground
2	Minidoka NHS – Block 22 Barracks 4:02pm	Visitors†	Immediate foreground
3	Interstate 84	Travelers	Foreground
4	Milner Historic Recreation Area	Visitors	Foreground
5	Idaho Highway 24	Travelers	Immediate foreground
6	U.S. Highway 26 – Peaks to Craters Scenic Byway/Richfield	Travelers, residents	Middleground
7	Idaho Highway 75 – Sawtooth Scenic Byway	Travelers	Middleground
8	Dietrich City Park	Residents	Foreground
9	U.S. Highway 26 – Peaks to Craters Scenic Byway	Travelers	Background
10	Wilson Butte Cave – North, East, South, and West	Visitors†	Immediate foreground
11	Devil's Corral	Visitors†	Foreground
12	The Blowout	Visitors	Middleground
13	Laidlaw Airstrip/corrals	Visitors	Middleground
14	Dean Brown Road	Visitors	Middleground
15	Craters of the Moon National Monument and Preserve	Visitors†	Middleground
16	Minidoka NHS – Honor Roll 7:20am	Visitors†	Immediate foreground
16	Minidoka NHS – Honor Roll 5:20pm	Visitors†	Immediate foreground
17	Sid Butte	Visitors†	Foreground

† Visitors may include affected communities as described in Section 3.5 (Cultural Resources) and Section 3.6 (Environmental Justice and Socioeconomics).

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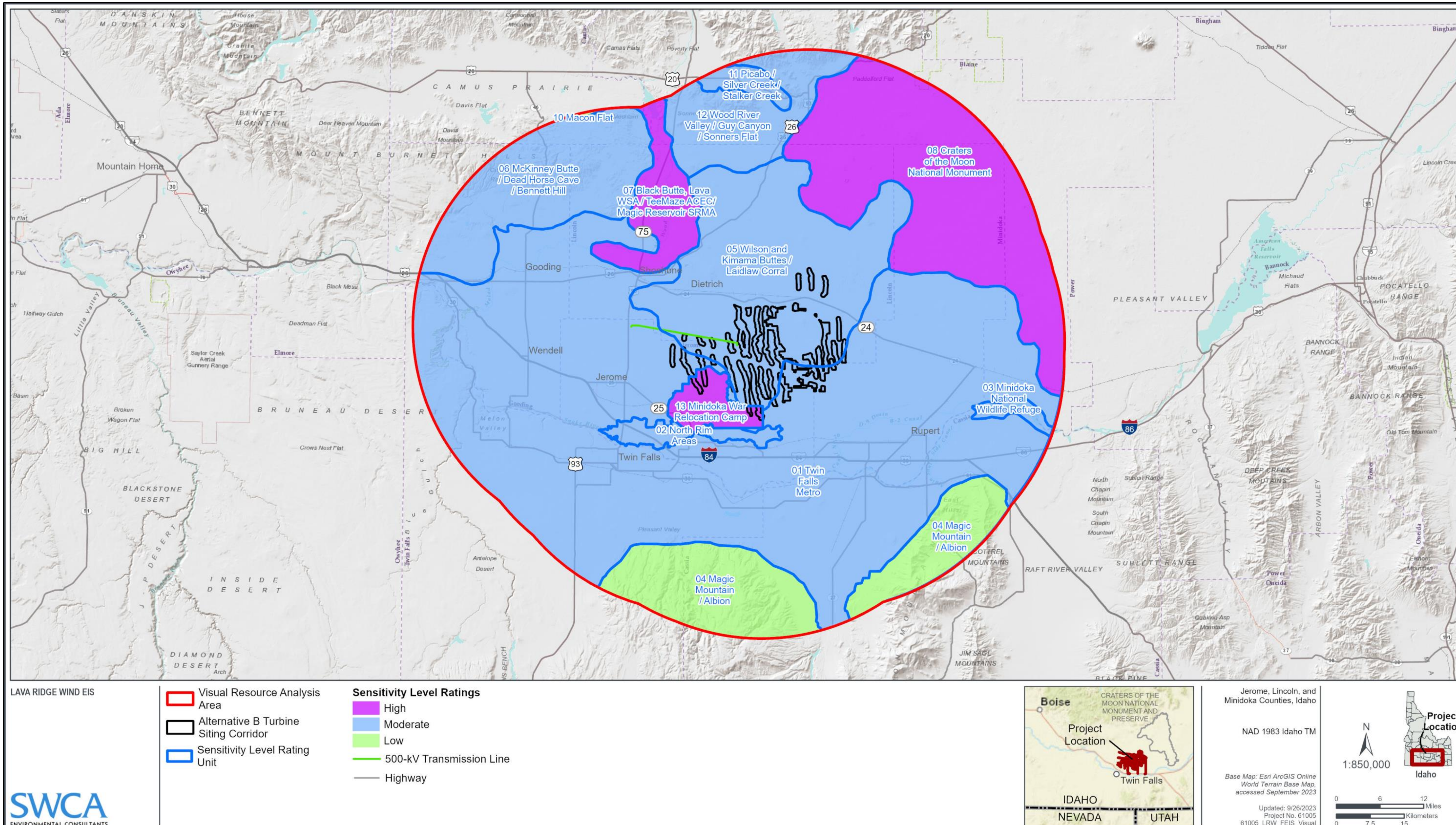

Figure 3.16-2. Sensitivity level ratings in the visual resource analysis area.

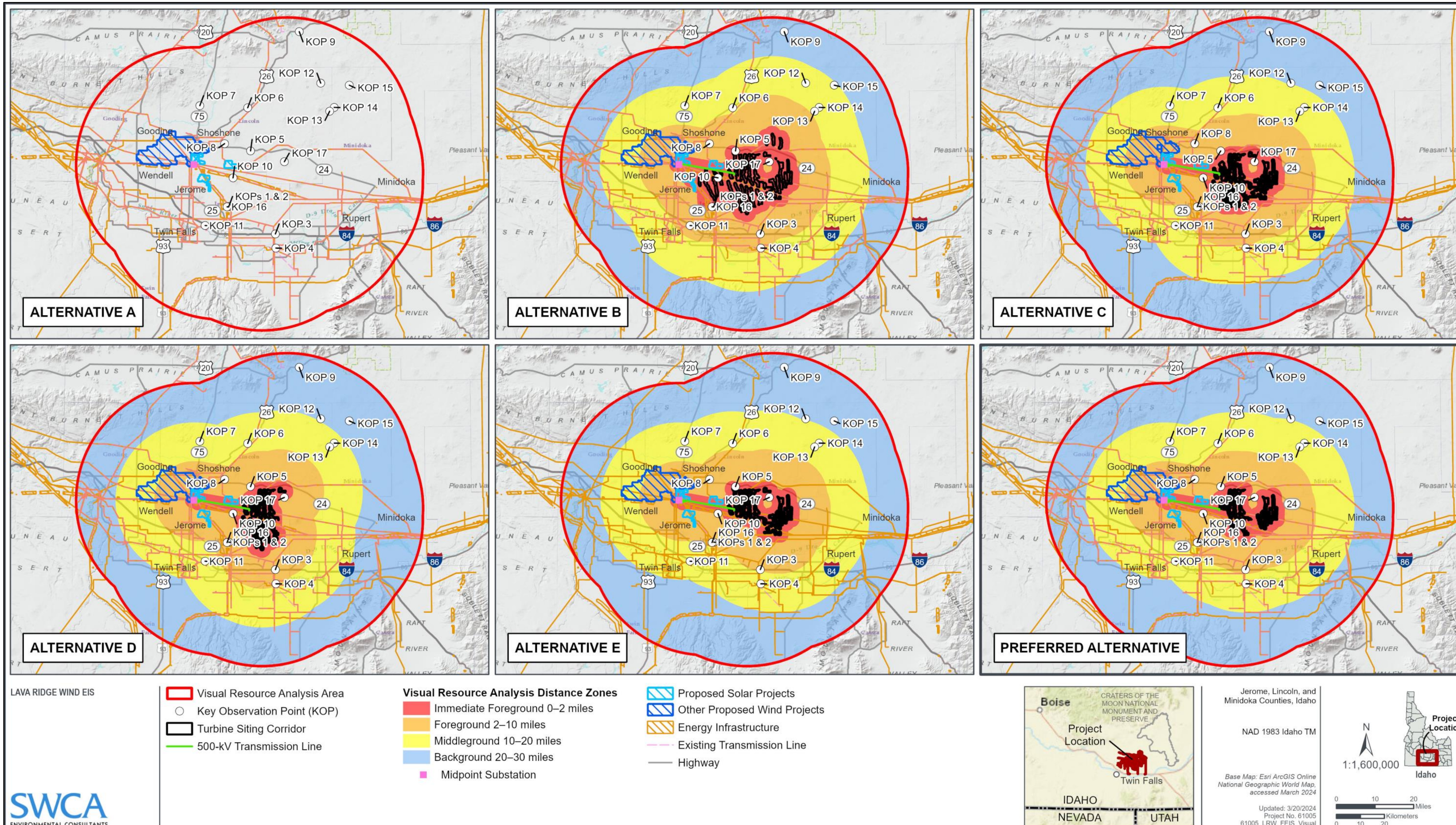

Figure 3.16-3. Key observation points and distance zones in the visual resource analysis area.

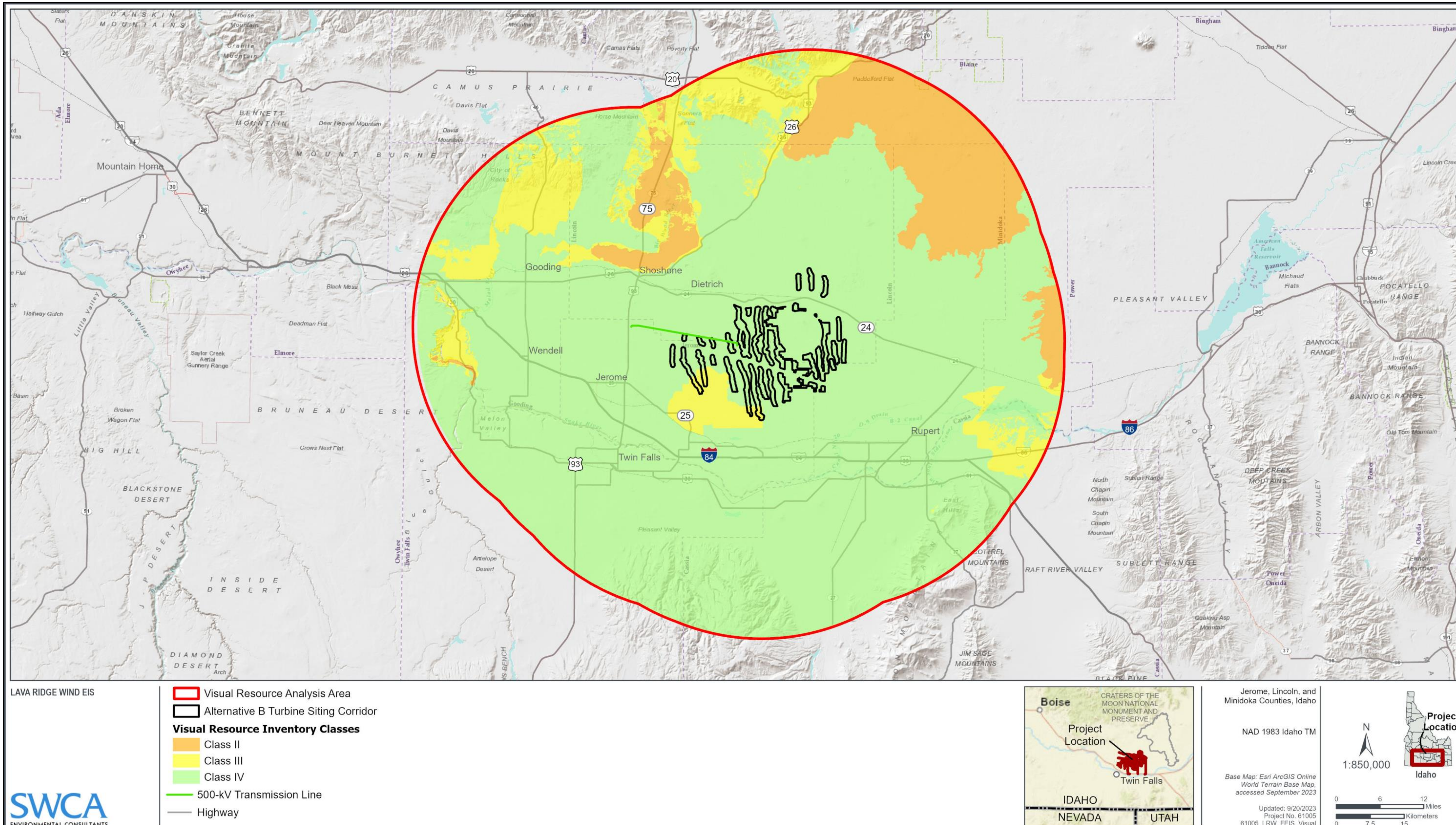

Figure 3.16-4. Project-level visual resource inventory classes.

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Visual resources on BLM public lands are managed in accordance with the VRM system. The visual analysis area for the project is managed under BLM (1986b), as amended, which provides management direction; however, BLM (1986b) does not establish VRM classes or associated visual management objectives for the analysis area. To address the issue of visual resource management within the analysis area, the BLM has a process that establishes interim VRM classes and objectives on a project basis. The BLM has established project-specific interim VRM classes for the action alternatives (Figure 3.16-5); for more information on the establishment of these classes, see EIS Appendix 9.

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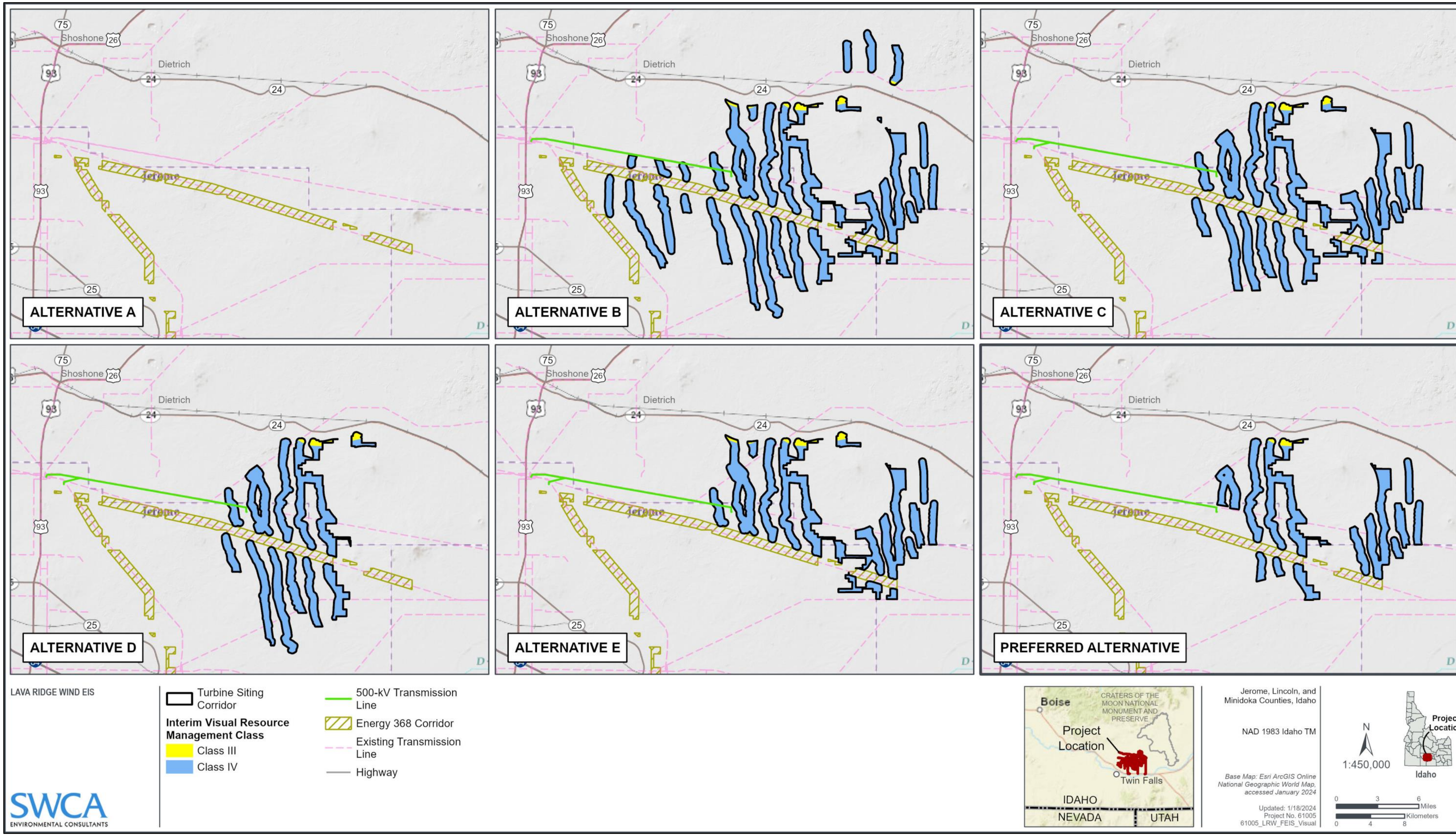

Figure 3.16-5. Project-specific Interim Visual Resource Management classes for all alternatives.

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3.16.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions (described in Section 3.1 [Introduction and Methodology]) related to changes in landscape character and scenic quality have and will continue to support the current agrarian character of the landscape. The anticipated incremental addition of future wind energy projects, and their tall industrial structures, in the analysis area would continue to contribute to the overall adverse degree of change in landscape character and associated scenic quality. In locations where wind energy projects are anticipated, viewers from KOPs in the analysis area may have visibility of more than one project in multiple directions, which would impact the viewers' experience. Continued growth of the Twin Falls metropolitan area and surrounding communities may reduce the agricultural character of the area in lieu of residential development, either dispersed residential or planned communities. Increased growth in these communities would increase the need for dispersed recreational opportunities, which in turn would experience adverse impacts from increased growth. These existing and future trends have affected or could affect the landscape character of the analysis area by introduction of residential development, access roads, and associated infrastructure.

3.16.1.2 Impacts

3.16.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and landscape character and scenic quality would only be affected by existing and future trends and actions.

3.16.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction and Work Area Maintenance

Project construction during the 2-year construction phase would affect the visual character and scenic quality of the analysis area by vegetation removal, fugitive dust generation, the presence and operation of construction equipment, transmission line stringing operations, and material stockpiling. The removal of vegetation would expose lighter-colored soils. Construction activities would introduce forms, lines, colors, textures, and motion not common in the siting corridors that would create moderate to major degrees of visual change during construction. MVE's applicant-committed measures to minimize work areas and infrastructure areas (measures 1, 2, and 19; Table App4-2 in EIS Appendix 4) would minimize, but not avoid, visual impacts during construction. Following construction, the generation of fugitive dust, construction equipment movement, and other site activities related to site preparations would cease, and interim reclamation of work areas would occur.

The turbines that would be assembled in the siting corridors during the 2-year construction phase would gradually become visually dominant in the landscape and would be the primary focus of attention for viewers. The construction-related changes to the characteristic landscape would be more perceivable in the immediate foreground (0–2 miles) and foreground areas (2–10 miles) and range from minor to major (Table 3.16-4) based on the type of construction activity taking place, time of year, and time of day.

Operation and Maintenance

Project operation would affect the visual character and scenic quality of the analysis area due to the visibility of the wind turbines, met towers, electrical collection system, substations and switchyard, battery energy storage systems (BESSs), overhead transmission lines, operation and maintenance facilities, and access roads. (See also EIS Appendix 5 [Select Visual Resources Simulations] and

Appendix C in SWCA [2024]). To avoid areas of new disturbance, MVE would bury powerlines where feasible within existing disturbance and co-locate linear features within 1 mile of existing facilities (required mitigation measures D and F; Tables App4-3 and App4-2c in EIS Appendix 4). Burying collector lines would reduce impacts to visual resources by removing some of the project infrastructure that would add contrast to the landscape. However, because turbines and larger transmission lines would remain aboveground and would be the tallest project components, the reduction of effects to visual resources from burying collector lines would be minor.

The large stature and white coloring of the wind turbines, along with the rotational motion of the turbine blades, would create a major degree of change (see Table 3.16-4) to the existing landscape character and would result in a major degree of visual change when viewed in the immediate foreground (0–2 miles) and a moderate degree of visual change when viewed in the foreground areas (2–10 miles). The additional 500-kV overhead transmission lines (consisting of a total of three alternative corridors), which are planned to be co-located within an existing transmission line corridor, collector lines, and dirt access roads, would introduce elements common in the landscape and would be visually subordinate compared to the visual scale and dominance of the wind turbines. In the middleground (10–20 miles), the project would attract attention, but would not dominate views. In background (20–30 miles), the degree of change to the existing landscape character and scenic quality would appear unaltered to the casual viewer with project elements being visible, but not attracting attention. MVE's applicant-committed measure 18 (avoiding vibrant colors and reflective surfaces) and measures 20 through 24 (specifying project lighting details and minimization measures) would minimize, but not avoid, visual impacts during operation.

Landscape Character and Scenic Quality

Visual impacts would be based on the degree of visual change (see Table 3.16-2) and changes to scenic quality ratings from the project introduction of wind turbines in the siting corridors (see Table 3.16-4). The visibility of the turbines using the minimum turbine height (545 feet) and maximum turbine height (740 feet) was used to estimate the percentage of acres experiencing visual change within each distance zone in relation to the total amount of acres within each distance zone. The results from this GIS analysis are summarized in Table 3.16-4 and detailed in SWCA (2024). Although the scenic quality rating associated with the VRI would be reduced by the project in locations near the siting corridors (SWCA 2024), the overall scenic quality rating (most commonly an overall scenic quality rating of C) would not change for any SQRU in the analysis area and at any distance zone. Further details regarding the overall change in scenic quality in the analysis area as it pertains to the SQRU, delineated and described as part of the project-level VRI (see Figure 3.16-4), are in SWCA (2024).

Alternative B would be visible from 99% of the immediate foreground (for both turbine heights) in relation to the analysis area total and would result in a major degree of visual change to landscape character and scenic quality in these areas of the immediate foreground (0–2 miles from the siting corridors) where the turbines would be visible. The degree of visual change would result from the introduction of project elements (turbines) as well as the scale and spatial relationships of the turbines in the landscape. The introduction of these project elements related to line, form, color, and texture adds cultural (human-made) modifications and reduces the adjacent scenic quality rating. The landscape would appear heavily altered, and the project elements would be out of scale or contain detail that is out of character with the landscape.

Alternative B would be visible from 85% to 90% of the foreground (depending on turbine size) in relation to the analysis area total and would result in a moderate degree of visual change to scenic quality in the areas of the foreground (2–10 miles from the siting corridors) where the turbines would be visible.

Depending on turbine size, Alternative B would be visible from 78% to 83% of the middleground (10–20 miles). Depending on turbine size, Alternative B would be visible from and 60% to 63% of the background (20–30 miles) in relation to the total distance zone acreage, which shows a moderate or lower change to scenic quality in the middleground and background zones. Visibility within these zones would also be influenced by environmental factors such as atmospheric conditions. Although there is still a modest percentage of acres within these distance zones experiencing visual impacts, viewers would likely only have visibility of the tallest portions of the turbine compared to the entirety of the turbine form and impacts from the turbine would be related to the motion of the turbine blades or tip rather than the turbine structure itself. Therefore, there would be no overall change to the scenic quality rating in the background zone, which is reflected in the assessed degree of visual change as None. This is described in more detail in SWCA (2024:Tables 6–13) per SQRUs.

Table 3.16-4. Degree of Visual Change by Distance Zone by Action Alternative (percentage of visible acres within the distance zone)

Distance Zone (miles from turbine siting corridors)	Turbine Height (feet)	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Immediate foreground (0–2 miles)	545	Major (99%)	Major (99%)	Major (98%)	Major (98%)	N/A
Immediate foreground (0–2 miles)	660	N/A	N/A	N/A	N/A	Major (99%)
Immediate foreground (0–2 miles)	740	Major (99%)	Major (99%)	Major (99%)	Major (99%)	N/A
Foreground (2–10 miles)	545	Moderate (85%)	Moderate (80%)	Minor (75%)	Minor (78%)	N/A
Foreground (2–10 miles)	660	N/A	N/A	N/A	N/A	Moderate (84%)
Foreground (2–10 miles)	740	Moderate (90%)	Moderate (85%)	Moderate (82%)	Moderate (83%)	N/A
Middleground (10–20 miles)	545	Minor (79%)	Minor (71%)	None (65%)	None (69%)	N/A
Middleground (10–20 miles)	660	N/A	N/A	N/A	N/A	Minor (74%)
Middleground (10–20 miles)	740	Moderate (84%)	Minor (78%)	Minor (74%)	Minor (76%)	N/A
Background (20–30 miles)	545	None (59%)	None (57%)	None (52%)	None (57%)	N/A
Background (20–30 miles)	660	N/A	N/A	N/A	N/A	Minor (63%)
Background (20–30 miles)	740	None (62%)	None (61%)	None (57%)	None (61%)	N/A

Note: This table describes the degree of visible change, where the project is visible, based on GIS visibility analysis at turbine tip height. Based on this analysis, areas in the background zone may only have visibility of the tallest portions of the turbine or the motion of the turbine. These percentages are calculated by taking the amount of visible area (in acres) within the distance zone and dividing it by the total amount of acres within the distance zone. Since the Preferred Alternative has a turbine height of 660 feet, only this height for the Preferred Alternative was analyzed. The filler of N/A (not applicable) has been used to indicate the unanalyzed heights for all alternatives.

Key Observation Points

Tables 3.16-5 through 3.16-7 present the degree of visual change from KOPs by categories of sensitive viewers observing the action alternatives from KOPs. Table 3.16-8 summarizes the degree of visual change for KOPs 1, 2, 3, 10, and 16 where the most change between action alternatives would occur. For all KOPs, visual changes for both minimum and maximum turbine heights would be the same. These similar results are attributed to the similarities in turbine elements (motion, texture, form, line, and color). The most distinguishing factor between the minimum and maximum turbine heights would be scale or height, and comparatively in the existing landscape, the ability for viewers to distinguish differences in height. Height-based visual change would be the most difficult element to comprehend without having both turbines in the built environment to compare against because there are no similar features near the project to compare with. If color, blade design, or another distinctive element is distinguishable, this may lead to more distinctive differences between turbine heights. Appendix F in SWCA (2024) provides additional GIS terrain analysis results (degree of potential turbine visibility on the horizon, miles of turbines on the horizon, and number of the maximum potentially visible turbines) to facilitate comparison of impacts for each KOP and alternative.

TRAVELERS

The degree of visual change for travelers from the Alternative B siting corridors would be major (see Table 3.16-5) at KOP 5 (Idaho Highway 24) in the immediate foreground (0–2 miles). This visual change correlates to Argonne visibility level 6, meaning there would be a strong visual contrast because the project would dominate the field of view and would be a major focus of visual attention (Sullivan et al. 2012). In addition to size and contrasts in form, line, color, and texture, the movement of the turbine blades would contribute substantially to drawing viewer attention under visibility level 6, and the visual prominence of the project would detract noticeably from views of other landscape elements (Sullivan et al. 2012).[37] The wind turbines would dominate the landscape in the immediate foreground at this KOP, which is approximately 0.9 mile from the nearest turbine siting corridor. From other KOPs, the casual traveler/general public would experience moderate, minor, or no visual change, equating to lower visibility levels that correlate with the corresponding degree of visual change. The degree of change is generally based on the distance from the KOP to the project. Photograph simulations illustrating the changes from KOPs are in SWCA (2024) Appendix C.

VISITORS

Under Alternative B, site visitors would experience major degrees of visual change in the immediate foreground at KOP 1 (Minidoka NHS Visitor Center) and KOP 10 (Wilson Butte Cave); see Table 3.16-6. Turbines would dominate the landscape in the immediate foreground of these KOPs, which are located approximately 1.7 miles and 0.9 mile from the siting corridors, respectively. From KOP 10 (Wilson Butte Cave), turbines would be visible in the field of view all around (360 degrees) under Alternative B, spanning a maximum distance of up to 24 miles across the eastward horizon, beginning with the nearest turbine siting corridor at a distance of 0.9 mile. From KOP 1 (Minidoka NHS Visitor Center), turbines would be visible across the full field of view (in a 135 degree arc) when focused northeastward, spanning a maximum distance of approximately 24 miles across the horizon, beginning with the turbine siting corridor at a distance of 1.7 miles. Additionally, site visitors at KOP 2 (Minidoka NHS Block 22 Barracks), which is within the foreground of the project, would have views of turbines within 1.7 miles, similar to KOP 1. Based on the proximity of turbines in both the immediate foreground and foreground areas and how viewers interact with the Minidoka NHS, impacts to KOP 2 would also be major. Viewers' attention from KOP 2 is generally focused to the east toward the Block 22 Barracks and would have

[37] See Appendix E in SWCA (2024) for more information on the Argonne visibility levels.

views of turbines in the foreground; however, as the viewer turns their attention to the north, views of the closer turbine corridor in the immediate foreground come into view. From KOP 16 at the Minidoka Honor Roll, which occurs within the foreground of the turbines, there would be a major degree of visual change in both morning and evening viewing conditions with the presence of the turbines behind the Honor Roll sign against the horizon. Viewers' attention from KOP 16 would generally be focused to the east toward the informational signs, including the Honor Roll sign, and would have views of the turbines in the foreground behind the signs. The landscape would appear to be severely altered because of the dominance of the wind turbine structures in scale, color, line, texture, and form, as well as the motion of the turbine blades, which would create major degrees of visual change in the setting. KOPs 1, 2, and 16 were simulated under two viewing conditions to reflect different times of day (see SWCA [2024] Appendix C). Both morning and evening at these KOPs would have major visual changes. The visual changes experienced at KOPs 1, 2, 10, and 16 correlate to Argonne visibility level 6, meaning there would be a strong visual contrast because the project would dominate the field of view and is a major focus of visual attention (Sullivan et al. 2012). In addition to size and contrasts in form, line, color, and texture, the movement of the turbine blades would contribute substantially to drawing viewer attention under visibility level 6, and the visual prominence of the project would detract noticeably from views of other landscape elements (Sullivan et al. 2012).[38] Impacts to sensitive viewer groups visiting Minidoka NHS may have impacts beyond the casual viewer in that they could experience the setting from a visual-cultural perspective disproportionally higher than the typical visitor (see Section 3.6.1.2 [Environmental Justice Communities, Impacts]). From KOP 17 at Sid Butte, there would be a major degree of visual change with the elevated position of the viewer and the arrangement of the turbines surrounding the butte. The landscape for KOP 17 would appear severely altered. Viewers' attention from KOP 17 would generally not be focused in any one direction, but the area would provide elevated 360 degree views of the landscape, and turbines would be visible at every cardinal direction. Alternative B would have minor or no degree of change at KOPs 4, 11, 12, 13, 14, and 15 for the casual viewer. Table 3.16-6 summarizes the degrees of visual change for site visitors by KOP. Views at all KOPs would have visual impacts to all visitors throughout the life of the project with the presence of turbines in the landscape. Activities that would be affected would range from culturally sensitive to non-sensitive uses and would include visitor education and interpretation, commemoration and healing, cultural and traditional uses, pilgrimage, photography, wildlife viewing, night sky viewing, rock hounding, winter snow activities, OHV activities, hunting, camping, and horseback riding; see Section 3.5 (Cultural Resources), Section 3.6 (Environmental Justice and Socioeconomics), Section 3.12 (Recreation) in EIS Appendix 15, and Section 3.19 (Minidoka National Historic Site Interpretive Purpose).

RESIDENTS

The degree of visual change for residents in the foreground of Alternative B would be moderate (see Table 3.16-7). Turbines would begin to dominate the visual setting of the landscape in the foreground of KOP 8 (Dietrich City Park), which is located approximately 6.5 miles from the nearest turbine siting corridor. The landscape from this KOP would appear to be substantially altered because of the prominence of the wind turbines, as well as the rotation motion of the turbine blades on the horizon, which would create a moderate contrast in the setting. The visual change experienced at KOP 8 correlates to Argonne visibility level 4, meaning the turbines would be obvious and with sufficient size or contrast to compete with other landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of the viewers' visual field (Sullivan et al. 2012). Residents would experience a minor degree of visual change at KOP 6 (Richfield) in the middleground (approximately 11.5 miles from the nearest turbine siting corridor). The visual change experienced at KOP 6 correlates to Argonne visibility level 2, meaning the turbines would be very small and faint, but when viewers scan the horizon or view the area closely, they could be detected without extended viewing

[38] See Appendix E in SWCA (2024) for more information on the Argonne visibility levels.

(Sullivan et al. 2012). Although the turbines would be noticed sometimes by the casual viewer, the general public would not notice visual changes without some active looking (Sullivan et al. 2012). Photographic simulations illustrating the changes from the KOPs are in SWCA (2024) Appendix C. Table 3.16-7 summarizes the degrees of visual change for residents by KOP.

Using a GIS terrain analysis, Appendix F in SWCA (2024) provides the turbines' degrees of potential visibility on the horizon, the number of miles the turbines could be visible across the horizon, and the number of turbines on the horizon. These calculations were developed for all KOPs, alternatives, and the minimum (545 feet) and maximum turbine heights (740 feet) and provide additional information for the degree of the maximum potential visibility the turbines would occupy in a viewers' view.

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Table 3.16-5. Degrees of Visual Change for Travelers and Distance Zone Location of KOP to Nearest Turbine Siting Corridor

KOP Number	KOP Name	Alternative B		Alternative C		Alternative D		Alternative E		Preferred Alternative	
		Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change
3	Interstate 84	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Minor	Foreground	Minor[†]
5	Idaho Highway 24	Immediate foreground	Major	Foreground	Major	Foreground	Major	Immediate foreground	Major	Foreground	Major[†]
6	U.S. Highway 26 – Peaks to Craters Scenic Byway/Richfield	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor[†]
7	Idaho Highway 75 – Sawtooth Scenic Byway	Middleground	None	Middleground	None	Middleground	None	Middleground	None	Middleground	None[†]
9	U.S. Highway 26 – Peaks to Craters Scenic Byway	Background	None	Background	None	Background	None	Background	None	Background	None[†]

Note: Results would be the same for the minimum and maximum turbine heights. Degree of visual change is defined in Table 3.16-2. Turbine visibility may be affected by topography and/or vegetation.
[†] Impacts for the Preferred Alternative were determined based on the impacts to KOPs at Alternatives C and E because the Preferred Alternative is a combination of both alternatives. Impacts to KOPs would be equal to or less than impacts at those alternatives depending on location.

Table 3.16-6. Degrees of Visual Change for Visitors and Distance Zone Location of KOP to Nearest Turbine Siting Corridor

KOP Number	KOP Name	Alternative B		Alternative C		Alternative D		Alternative E		Preferred Alternative	
		Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change
1*	Minidoka NHS – Visitor Center[‡] 10:05am	Immediate foreground	Major	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate
1*	Minidoka NHS – Visitor Center[‡] 3:55pm	Immediate foreground	Major	Foreground	Moderate	Foreground	Moderate	Foreground	Minor	Foreground	Moderate
2*	Minidoka NHS – Block 22 Barracks[‡] 7:50am	Immediate foreground	Major	Foreground	Major	Foreground	Major	Middleground	Minor	Foreground	Minor
2*	Minidoka NHS – Block 22 Barracks[‡] 4:02pm	Immediate foreground	Major	Foreground	Major	Foreground	Major	Middleground	Minor	Foreground	Minor
4	Milner Historic Recreation Area	Foreground	Minor	Middleground	Minor	Foreground	Minor	Middleground	Minor	Middleground	Minor[§]
10	Wilson Butte Cave – North[‡]	Immediate foreground	Major	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate
10	Wilson Butte Cave – South	Immediate foreground	Major	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate
10	Wilson Butte Cave – East	Immediate foreground	Major	Foreground	Major	Foreground	Major	Foreground	Major	Foreground	Major
10	Wilson Butte Cave – West	Immediate foreground	Major	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate
11	Devil's Corral[‡]	Foreground	None	Middleground	None	Middleground	None	Middleground	None	Middleground	None[§]
12	The Blowout	Middleground	Minor	Background	Minor	Background	Minor	Background	Minor	Background	Minor[§]
13	Laidlaw Airstrip/corrals	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor[§]
14	Dean Brown Road	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor	Middleground	Minor[§]
15	Craters of the Moon National Monument and Preserve[‡]	Middleground	Minor	Background	Minor	Background	Minor	Background	Minor	Background	Minor[§]
16*	Minidoka NHS – Honor Roll 7:20am[‡]	Immediate foreground	Major	Foreground	Major	Foreground	Major	Foreground	Moderate	Foreground	Moderate

KOP Number	KOP Name	Alternative B		Alternative C		Alternative D		Alternative E		Preferred Alternative	
		Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change
16*	Minidoka NHS – Honor Roll 5:20pm‡	Immediate foreground	Major	Foreground	Major	Foreground	Major	Foreground	Moderate	Foreground	Moderate
17	Sid Butte‡	Foreground	Major	Foreground	Major	Foreground	Major	Foreground	Major	Foreground	Major§

Note: Results would be the same for the minimum and maximum turbine heights. Degree of visual change is defined in Table 3.16-2. Turbine visibility may be affected by topography or vegetation.

* KOP simulations 1, 2, and 16 depict typical condition as well as worst-case scenario condition where a turbine blade is facing the viewer.

‡ See Section 3.5 (Cultural Resources) and Section 3.6 (Environmental Justice and Socioeconomics) for more details regarding potential impacts to the affected communities that retain strong connections and associations with these locations. These communities' use of and association with these locations are not casual in nature (for more details, see Section 3.5 and [Cultural Resources] and Section 3.6 [Environmental Justice and Socioeconomics]).

§ Impacts for the Preferred Alternative were determined based on the impacts to KOPs at Alternatives E and C because the Preferred Alternative is a combination of both alternatives. Impacts to KOPs would be equal to or less than impacts at those alternatives depending on location.

Table 3.16-7. Degrees of Visual Change for Residents and Distance Zone Location of KOP to Nearest Turbine Siting Corridor

KOP Number	KOP Name	Alternative B		Alternative C		Alternative D		Alternative E		Preferred Alternative	
		Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change	Distance Zone Location of KOP to Nearest Turbine Siting Corridor	Degree of Visual change
8	Dietrich City Park	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate	Foreground	Moderate*

Note: Results would be the same for the minimum and maximum turbine heights. Degree of visual change is defined in Table 3.16-2. Turbine visibility may be affected by topography and/or vegetation.

* Impacts for the Preferred Alternative were determined based on the impacts to KOPs at Alternatives E and C because the Preferred Alternative is a combination of both alternatives. Impacts to KOPs would be equal to or less than impacts at those alternatives depending on location.

Table 3.16-8. Degrees of Visual Change – Alternatives Comparison

KOP Number	KOP Name	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
1	Minidoka NHS – Visitor Center 10:05am	Major	Moderate	Moderate	Moderate	Moderate
1	Minidoka NHS – Visitor Center 3:55pm	Major	Moderate	Moderate	Moderate	Moderate
2	Minidoka NHS – Block 22 Barracks 7:50am	Major	Major	Major	Minor	Minor
2	Minidoka NHS – Block 22 Barracks 4:02pm	Major	Major	Major	Minor	Minor
3	Interstate 84	Moderate	Moderate	Moderate	Minor	Minor
10	Wilson Butte Cave – North	Major	Moderate	Moderate	Moderate	Moderate
10	Wilson Butte Cave – South	Major	Moderate	Moderate	Moderate	Moderate
10	Wilson Butte Cave – East	Major	Major	Major	Major	Major
10	Wilson Butte Cave – West	Major	Moderate	Moderate	Moderate	Moderate
16	Minidoka NHS – Honor Roll 7:20am	Major	Major	Major	Moderate	Moderate
16	Minidoka NHS – Honor Roll 5:20pm	Major	Major	Major	Moderate	Moderate

Note: Results would be the same for the minimum and maximum turbine heights. Degree of visual change is defined in Table 3.16-2. Turbine visibility may be affected by topography and/or vegetation. Degree of visual change was calculated using BLM Contrast Rating Worksheets and is contained in Appendix B of SWCA (2024).

Decommissioning

The effects of project decommissioning would be similar to the effects of construction in that there would be the temporary introduction of construction equipment and ground disturbance. However, degrees of visual change from decommissioning would differ from construction in that lands previously disturbed throughout the siting corridors would likely become less visible over time because of reclamation activities and revegetation. Removal of vertical project infrastructure would be more immediate, which would influence the degrees of visual change to preconstruction characteristics in a shorter duration of time. For example, as soon as the turbines and transmission structures are removed, they would no longer affect the landscape characteristics within the foreground and beyond (beyond 2 miles). It would take approximately 5 years for grasses to re-establish after final reclamation but could take up to 50 years following decommissioning for the project footprint to be no longer visible (i.e., for the vegetation in the siting corridors to be as close to undisturbed surrounding conditions as feasible) in the immediate foreground (0–2 miles).

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (Table 3.16-9; see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to landscape character and scenic quality under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for landscape character and scenic quality are summarized in Table 3.16-9 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.16-9. Mitigation for Landscape Character and Scenic Quality

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1–2	D	qqq
18–24	F	rrr–sss

Note: All measures are detailed in EIS Appendix 4.

With the addition of these measures, the effects of the project would be lower. There would be less light reflection off project infrastructure, which would reduce the visual contrast on the landscape.

3.16.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would have similar effects to the degree of visual change and scenic quality as Alternative B for both turbine heights, except viewers along the western and southwestern edge of the project would experience a reduced degree of visual change. At viewing locations on the western and southwestern side of the project, the reduction of the western siting corridors would result in turbines being further away and the project encumbering a smaller field of vision. These changes would lower the contrast of the project elements compared to other landscape features when compared to Alternative B. Temporary visual impacts associated with project construction would also be reduced with a shorter construction timeline.

Visual impacts as seen from Minidoka NHS would be reduced compared to Alternative B at the Minidoka NHS Visitor Center (KOP 1) from major to moderate. Turbines would be visible in a smaller portion of the field of vision (in a 70 degree arc) and span a smaller 10-mile portion of the horizon (where they are not blocked from view by intervening topography, vegetation, and structures). This impact reduction includes the nearest turbines being sited 4.7 miles further in Alternative C; they would appear 70% smaller in size under Alternative C compared to Alternative B. At the Minidoka NHS Block 22 Barracks (KOP 2), visual impacts would be reduced compared to Alternative B with reduced visual impacts (moderate) to form, line, color, and texture. Visual impacts to travelers along Idaho Highway 24 (KOP 5) and U.S. Highway 26 (KOP 6) would introduce the same contrast at the KOPs but would be reduced along the entire length of these vehicular travel routes because of the reduced western and northern turbine corridors compared to Alternative B. Impacts to viewers from Wilson Butte Cave (KOP 10 North, South, and West) would be reduced relative to Alternative B because of the reduced number of turbine corridors west and south of Wilson Butte Cave (KOP 10). At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternative C, the nearest potential turbine would appear 60% smaller under Alternative C compared to Alternative B. At Minidoka NHS Honor Roll (KOP 16), visual impacts would be reduced relative to Alternative B and similar to KOP 2, with views blocked by some intervening topography and signage related to the Honor Roll. From these KOPs (1, 2, 5, 6, 10, and 16), the project components would appear smaller on the horizon due to the increased distance between 1 and 4.7 miles (see SWCA [2024]) to each KOP compared to Alternative B, and the visual dominance of the project would be reduced at each KOP. Impacts to other KOPs (3, 4, 7, 8, 9, 10 East and North, 11, 12, 13, 14, and 15) would remain the same as Alternative B.

3.16.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

When compared to Alternatives B and C, siting corridors under Alternative D would have an overall smaller footprint and are consolidated into an area that takes up the least amount of the visual landscape from multiple viewing directions. In general, visual impacts under Alternative D would be similar to Alternative B and C within the immediate foreground (major) but would be reduced in the foreground (moderate to minor) and middleground (minor to none). Both Alternative D and C would reduce the number corridors on the western edge of the siting corridors, so Alternative D would have similar impacts to viewing locations on the western and southwestern side of the project as described for Alternative C. Alternative D also removes siting corridors on the eastern side, and as a result, viewing locations to the east and southeast would experience less overall contrast and a smaller area where impacts would be major. The reduction in the overall visual impacts from Alternative D is a result of a reduced proximity to turbines and project elements encompassing a smaller field of vision. The reduced potential for visual impacts would also apply to temporary visual impacts associated with project construction.

When compared to Alternative B, viewers under Alternative D with the minimum turbine height would have a reduced degree of turbine visibility across the horizon; less miles of turbines visible on the horizon; and fewer turbines visible at all KOPs except at KOPs 9 and 13, which would remain the same as Alternative B. When compared to Alternative B, viewers under Alternative D with the maximum turbine height would have a reduced degree of turbine visibility across the horizon and less miles of turbines visible on the horizon at all KOPs except at KOPs 9 and 13, which would remain the same as Alternative B. Viewers would see fewer turbines at most KOPs; however, KOPs 4 and 5 would have an increase in visible turbines compared to Alternative B, and KOPs 9 and 13 would remain the same as Alternative B.

When compared to Alternative C, viewers under Alternative D with the minimum turbine height would have a reduced degree of turbine visibility across the horizon at all KOPs except at KOPs 12 and 17, and KOPs 5, 6, 14, and 15 would remain the same as Alternative C. Alternative D would have less miles of turbines visible on the horizon at all KOPs except at KOPs 6, 9, 13, 14, and 15, which would remain the same as Alternative C. Alternative D would have fewer turbines visible at all KOPs except at KOPs 9, 13, 14, and 15, which would remain the same as Alternative C. When compared to Alternative C, viewers under Alternative D with the maximum turbine height would have a reduced degree of turbine visibility from KOPs 3, 4, 6, 12, 14, 15, and 17; however, viewers would see an increased degree of turbine visibility at KOPs 1, 2, 7, 8, 10, 11, and 16, and KOPs 5, 9, and 13 would remain similar to Alternative C. Alternative D would have less miles of turbines visible on the horizon at KOPs 1, 2, 5, 11, and 16; however, there would be an increase of mileage on the horizon at KOPs 3, 4, 6, 7, 8, 10, 12, 14, 15, and 17 and no change in mileage on the horizon at KOPs 9 and 10. Alternative C would have fewer turbines visible at all KOPs compared to Alternative D, except at KOP 11, which would have an additional 10 turbines visible, and at KOPs 9 and 13, which would remain the same as Alternative C.

Similar to Alternative C, the increased distance from the turbine corridors would reduce the visual impacts experienced at the Minidoka NHS Visitor Center (KOP 1) from major under Alternative B to moderate in Alternative D. At KOP 1, as distances to the nearest turbine siting corridor increase under Alternatives C and D, the nearest potential turbine would appear 70% smaller under Alternatives D and C compared to Alternative B. At the Minidoka NHS Block 22 Barracks (KOP 2), visual impacts would be similar to Alternative C (moderate overall) in form, line, color, and texture. Visual impacts to travel routes such as Interstate 84 (KOP 3), Idaho Highway 24 (KOP 5), and U.S. Highway 26 (KOP 6) would be the same as Alternative B and C, introducing the same contrast at the KOPs but would be reduced along the entire length of these vehicular travel routes because of the reduced turbine corridors from east to west. Impacts to viewers at Wilson Butte Cave (KOP 10 North, South, and West) would be reduced under Alternatives C and D; the nearest potential turbine would appear 60% smaller under Alternatives C and D compared to Alternative B. At KOP 16 (Minidoka NHS Honor Roll), visual impacts are expected to be reduced compared to Alternative B and similar to impacts under Alternative C. From KOPs 1, 2, 3, 5, 6, 10, and 16, the project would appear smaller on the horizon with the increased distance, between 0.8 and 5.2 miles (see SWCA [2024]) per KOP compared to Alternative B, and the visual dominance of the project would be reduced at each KOP. Impacts to other KOPs (4, 7, 8, 9, 10 East, 11, 12, 13, 14, and 15) would remain the same as Alternatives B and C.

3.16.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The siting corridors in Alternative E would encompass a slightly larger area than Alternative D, but the siting corridors would be more spread out, so the overall the project would take up more of the overall visual landscape as viewed from multiple locations. Depending on the turbine size selected, Alternative E may allow for the smallest number of turbines, so the total number of project elements contributing to visual impacts may be less. In general, visual impacts under Alternative E would be similar to Alternative B and C within the immediate foreground (major) but would be reduced in the foreground (moderate to minor) and middleground (minor to none) when compared to Alternative B and C. In addition to reducing siting corridors on the western edge of the project like Alternatives C and D, Alternative E also reduces the southernmost corridors that are most visible when looking east from Minidoka NHS. However, Alternative E retains the eastern corridors that would be removed under Alternative D. The difference in locations of the siting corridors proposed in Alternative E results in the least amount of visual impacts from viewing locations to the south and southwest; however, Alternative E would result in similar impacts as Alternative B and C from viewing locations east of the project. The increase in distance from viewing locations to the south and southwest of the project further reduces visual impacts in these areas by reducing elements of high contrast and further reducing the area the project would occupy in the viewers' field of vision at these locations.

When compared to Alternative B, viewers under Alternative E with the minimum turbine height at all KOPs would have a reduced degree of turbine visibility across the horizon; less miles of turbines visible on the horizon; and fewer turbines visible at all KOPs except at KOPs 9, 11, and 13, which would remain the same as Alternative B. When compared to Alternative B, viewers under Alternative E with the maximum turbine height at all KOPs would have a reduced degree of turbine visibility across the horizon except at KOPs 9 and 13, which would remain the same. Alternative E would have less miles of turbines visible across the horizon at all KOPs except at KOP 4, which is slightly increased, and at KOPs 9 and 13, which would remain the same as Alternative B. The number of visible turbines would be reduced at all KOPs except at KOPs 4 and 15, which would be increased, and at KOPs 9 and 13, which would remain the same.

When compared to Alternative C, viewers under Alternative E with the minimum turbine height would have the same or a reduced degree of turbine visibility across the horizon at all KOPs except at KOPs 12 and 17. Alternative E would have a similar or a reduced number of miles of turbines visible on the horizon at all KOPs and a similar or a reduced number of turbines that are visible. Alternative E with the maximum turbine height would result in a reduced degree of turbines on the horizon at all KOPs except at KOPs 4 and 12, which would be increased, and at KOPs 5, 6, 9, 13, 14, 15, and 17, which would remain the same. Alternative E would have less miles of turbine visibility across the horizon at all KOPs except for at KOP 4, which would increase, and at KOPs 6, 9, and 13, which would remain the same. Alternative E would also have a reduced number of turbines at all KOPs except for KOP 14, which would have an increased number of turbines visible, and at KOPs 9 and 13, which would remain the same as Alternative C.

When compared to Alternative D, viewers under Alternative E with the minimum turbine height would have a reduced degree of turbine visibility at all KOPs except at KOPs 3, 6, 14, 15, and 17 and would remain the same for KOP 5, 9, 11 and 13. Alternative E would have a similar or a reduced number of miles of turbines visible on the horizon at all KOPs except at KOPs 3, 6, 12, 14, 15, and 17. Alternative E would also have a similar or reduced number of turbines visible at all KOPs except at KOPs 14 and 15. When compared to Alternative D, viewers under Alternative E with the maximum turbine height would have a reduced degree of turbine visibility at all KOPs except at KOPs 3, 4, 6, 14, 15, and 17, which would have an increased degree of turbine visibility. Alternative E would have a similar or a reduced number of miles of turbines visible across the horizon except at KOPs 3, 4, 6, 7, 12, 14, 15, and 17. Alternative E would have a reduced number of turbines visible at all KOPs except at KOPs 4, 14, and 15.

The increased distance from the turbine corridors would reduce the visual impacts experienced at the Minidoka NHS Visitor Center (KOP 1) from major under Alternative B to moderate under Alternative E, with an additional reduction in project elements compared to Alternatives C and D. At KOP 1, as distances to the nearest turbine siting corridor increase under Alternative E, the nearest potential turbine would appear 80% smaller under Alternative E compared to Alternative B and 35% smaller under Alternative E compared to Alternatives C and D. At Minidoka NHS Block 22 Barracks (KOP 2), visual impacts would be reduced compared to Alternative B (major overall), with reduced visual impacts (minor) in form, line, color, and texture. Alternative E also shows a reduced impact from Alternatives C and D, which results from additionally reduced turbine corridors on the southern side of the project, and an even further reduction compared to Alternative B. Visual impacts to travel routes such as Interstate 84 (KOP 3), Idaho Highway 24 (KOP 5), and U.S. Highway 26 (KOP 6) would be the same as Alternative C. Visual impacts near Wilson Butte Cave (KOP 10) would also be reduced under Alternative E as compared to other action alternatives but remain major. At KOP 10, as distances to the nearest turbine siting corridor increase from 0.9 mile under Alternative B to 2.5 miles under Alternatives C and D and to 3 miles under Alternative E, the nearest potential turbine would appear 67% smaller under Alternative E compared to Alternative B and 17% smaller under Alternative E compared to Alternatives C and D. From Minidoka NHS Honor Roll (KOP 16), views are anticipated to be reduced to minor with the increased distance between the KOPs and turbine corridors when compared to Alternatives B, C, and D. From these KOPs (1, 2, 3, 5, 6, 10, and 16), the project would appear smaller on the horizon due to the increased distance—between 1.6 and 7.2 miles (see SWCA [2024]) per KOP as compared to Alternative B—and the visual dominance of the project would be reduced at each KOP. Visual impacts to KOPs from Alternative E would be the fewest of all action alternatives because of the lack of turbine corridors nearest KOPs 1, 2, 3, 4, and 10 (North, South, and West). Alternative E would have fewer impacts to KOPs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 14 compared to Alternative B and would have fewer impacts to

KOPs 1, 2, 3, 4, 11, and 16 compared to Alternatives C and D. Impacts to other KOPs (5, 6, 7, 8, 9, 10 [East], 11, 12, 13, 14, and 15) would remain the same as Alternatives B, C, and D.

3.16.1.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative was identified to reduce visual impacts to Minidoka NHS (represented by viewing from KOPs 1, 2, and 16). The development of this alternative included adjustments to siting corridors and infrastructure to avoid or minimize visual impacts to Minidoka NHS while balancing development of wind resources. The siting corridors under the Preferred Alternative would be a combination of Alternatives C, D, and E; however, the maximum turbine tip height would be up to 660 feet (5 MW) instead of 740 feet (6 MW).

When compared to Alternative B, the Preferred Alternative would have fewer impacts compared to Alternative B, which is reflected in the reduced footprint of and distance to the turbine corridors, as well as the presence of intervening features such as vegetation and structures that aid in screening the project. This would reduce visual impacts at KOPs 1, 2, and 16 and at KOP 10 North, South, and West (see Table 3.16-8). Visual impacts to KOPs 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 17 would be similar to Alternative B.

When compared to Alternative C, the Preferred Alternative would have similar impacts at all KOPs, including for Minidoka NHS KOPs 1 and 16 (Visitors Center and Honor Roll, respectively), with the exception of viewing from KOP 2 (Block 22 Barracks). Impacts at KOP 2 would be reduced from moderate to minor. When compared to Alternative D, the Preferred Alternative would have similar impacts at all KOPs.

The Preferred Alternative would be similar to Alternative C, D, and E but would encompass a slightly smaller area with decreased turbine corridors on the southern end of the project and the northern end of the project near ID 24. When compared to Alternative C, the Preferred Alternative would have similar impacts at all KOPs, except at KOP 2. Impacts at KOP 2 would be reduced from moderate to minor. When compared to Alternative D, the Preferred Alternative would have similar impacts at all KOPs. When compared to Alternatives B, C, D, and E, the Preferred Alternative reduces the amount of siting corridors in the southern part of the project.

3.16.1.2.7 CUMULATIVE IMPACTS

The trend for increased renewable energy development in the analysis area and the potential additive or synergistic effects of other renewable energy projects (of similar size and scale; see Figure 3.16-3) in combination with the Lava Ridge Wind Project would add industrial features to a landscape where there are not currently any large-scale renewable energy projects. The construction, operation, and decommissioning of similar projects would result in additional surface disturbances and construction temporary impacts. The potential effects of additional wind energy would expand the area of contrast (associated with the visual elements of form, line, color, and texture) commonly found with wind turbines and ancillary structures. A project like this, where the project elements being introduced are not currently found in the existing landscape, would set the stage for similar types of projects and development to occur within the area. Development of the Lava Ridge Wind Project alongside other existing developments in the area would add to the adverse impacts to residences, recreational areas and activities, and vehicular travel routes.

For each alternative, the precedence set by the scale of the Lava Ridge Wind Project would invite the exploration and potential construction of other projects of a similar scale. Since Alternative B would have the most turbines, miles of transmission line, ground disturbance, and traffic, it would have the most cumulative visual impacts on the viewable landscape when combined with existing and future trends and actions. Alternative D is likely to have the fewest turbines (although this will be based on final placement), miles of transmission line, ground disturbance, and traffic, and thus would have the least cumulative effects when combined with existing and future trends and actions that may be in or around the project.

3.16.1.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, there would be an irretrievable effect on landscape character and scenic quality throughout the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 50 years for vegetation to reestablish after final reclamation). Short-term visual effects from site preparation activities would occur during the up-to-3-year construction phase and until interim reclamation is completed. There would be long-term effects from the introduction of wind turbines and other project infrastructure during the 30-year operation phase. Long-term irretrievable effects would occur until project infrastructure is removed and final reclamation is completed. As described above, during decommissioning, removal of vertical project infrastructure would be more immediate, which would influence the degrees of visual change to preconstruction characteristics in a shorter duration of time within the foreground and beyond (beyond 2 miles). It would take approximately 5 years for grasses to reestablish after final reclamation but could take up to 50 years following decommissioning for the project footprint to be no longer visible (i.e., for the vegetation in the siting corridors to be as close to undisturbed surrounding conditions as feasible) in the immediate foreground (0–2 miles).

3.16.1.4 Compensatory Mitigation

With the implementation of applicant-committed measures and other mitigation (see EIS Appendix 4), no compensatory mitigation for landscape character and scenic quality is proposed. A project-specific interim VRM was prepared for the project (see Figure 3.16-5), and the turbine siting corridors would be located in project-specific interim VRM Class IV. Even under the Preferred Alternative, the change in landscape character would result in residual visual impacts to cultural resources and disproportionately high and adverse impacts to Japanese American and Minidoka-connected communities and Native American Tribes, and the NPS considers the visual impacts to the Minidoka NHS interpretive purpose to be major. Please see the compensatory mitigation described in EIS Sections 3.5.5.4, 3.6.1.4.1, and 3.19.4 for more information.

3.16.2 Night Skies

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.16-10.

Table 3.16-10. Analysis Approach for Night Skies

Issue Analyzed in Detail	How would project lighting impact sensitive viewers and night skies at CRMO and at Minidoka NHS? How would aircraft warning lighting impact sensitive viewers and night skies during operation?
Analysis Area	The nightscapes viewed from CRMO and Minidoka NHS.
Indicators	Change in night sky brightness as modeled in the night skies assessment.
Impacts Duration	The life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives.

Data Sources	Night sky brightness data collected by the NPS at CRMO and Minidoka NHS. Modeled change in night sky brightness from two observation points selected in coordination with the NPS—one each in CRMO and Minidoka NHS (Dark Sky Partners 2022)—and available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). The model calculated sky brightness from artificial lighting, taking into account effects on light propagation caused by buildings, vegetation, and terrain that may block light emissions.
Assumptions or Approach	The modeling for the project assumed that 80% of the light emitted by the project would not be blocked because the terrain is relatively flat and vegetation is low and because the aviation lighting would be mounted high on turbines. A ground reflectivity value typical of a variety of surfaces (e.g., terrain, vegetation, dirty concrete, and aged asphalt) was selected that has been shown to adequately characterize ground reflectivity (except when snow is present) (Dark Sky Partners 2022).

3.16.2.1 Affected Environment

Although no part of the siting corridors would be located on NPS lands, there are two nearby NPS parks with viewsheds that would be impacted by the project: CRMO, an internationally recognized dark sky park, and Minidoka NHS. These parks offer places for people to connect with the natural world, including the night sky. The natural lightscape provided by dark night skies is also important for plants and wildlife. Wildlife depends on the cover of darkness to hunt for food, and in turn, hide from predators; light pollution can also affect the natural cycles of plants (NPS 2021).

Project siting corridors would be located approximately 19.3 miles from CRMO, which was designated as an International Dark Sky Park in 2017 for its outstanding night skies. The park's 2020 annual report to the International Dark Sky Association (Gillette 2020) reported an average night sky brightness of 21.47 magnitudes per square arcsecond (mag. $arcsec^{-2}$) across 13 locations in the park. This is consistent with the sky brightness recorded at CRMO for MVE's night skies assessment (that measured brightness in the direction the project would be visible), which ranged from 20.06 mag. $arcsec^{-2}$ near the horizon (5 degrees) to 22.12 mag. $arcsec^{-2}$ at the highest point in the sky (90 degrees) (Dark Sky Partners 2022). Most of the existing light pollution visible from CRMO comes from Arco, Idaho, approximately 15 miles northeast of the park. Sky glow from Idaho Falls and Twin Falls, Idaho, is visible on the horizon to the east and southwest, respectively.

Minidoka NHS is a WWII Japanese American incarceration site and is approximately 1.1 miles from the nearest proposed siting corridor. The night sky at Minidoka NHS is significantly brightened from existing lighting in Twin Falls and Jerome, Idaho, and other communities along the I-84 corridor. Currently, the darkest part of the horizon is toward the northeast, north, and northwest of the site (the direction of the Lava Ridge Wind Project). Existing night sky brightness recorded at Minidoka NHS for the night skies assessment ranged from 20.29 mag. $arcsec^{-2}$ at 10 degrees above the horizon to 21.15 mag. $arcsec^{-2}$ at the highest point in the sky (90 degrees).

3.16.2.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions related to changes in night sky conditions have and will continue to impact dark sky conditions. In addition to light domes, there are currently areas of brightened lighting in other communities along and near the I-84 corridor. Future growth of the Twin Falls metropolitan area and surrounding communities will increase development that may impact dark skies as new sources of nighttime lighting are introduced and development expands. Additional renewable energy development proposed in the SFO planning area (described in Section 3.1 [Introduction and Methodology]) could also increase the amount of lighting to the areas evaluated in this EIS.

3.16.2.2 Impacts

3.16.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and night skies would only be affected by existing and future trends and actions.

3.16.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction of the project would introduce new sources of artificial light in the analysis area during the 2-year construction phase. Construction and decommissioning light sources would be temporary (i.e., portable lighting plants and lights on construction office structures). The overhead sky brightness after project construction, as seen from Minidoka NHS and CRMO, is anticipated to remain at a similar level to the current conditions of scattered light from nearby towns (Dark Sky Partners 2022).

During the 30-year operation phase, turbines would be lit with either two (3-MW turbines) or five (6-MW turbines) FAA L-864 obstruction lights, as required by the FAA (see the Project Lighting section in EIS Appendix 11; applicant-committed measure 20). This would result in a total output of 2,400,000 lumens (from 400 3-MW turbines) to 5,235,000 lumens (from 349 6-MW turbines). Most of the light emitted by the obstruction would be directed within 5 degrees above the horizontal, with a small fraction of the light emitted downward (applicant-committed measure 21). Lighting would also be installed at seven new substations, the battery energy storage area, and at operation and maintenance facilities. Typical facility lighting emits most light downward to illuminate the ground, and any emission directed above the horizon would be concentrated near and just above the horizontal (applicant-committed measure 23). The lighting scenarios modeled for facilities (operation and maintenance, substations, battery storage) would emit light 3,967 to 4,715 feet above mean sea level and have 36 to 56 fixtures per facility, producing 560,340 to 871,640 lumens (Dark Sky Partners 2022). The operation and maintenance buildings would produce the least lumens, and the battery storage facility would produce the most lumens.

For Alternative B, five lighting scenarios representing maximum (scenario 1) and minimum (scenario 5) potential light outputs from the project were evaluated to assess the range of potential impacts on the night sky at the selected observation points. Scenarios considered either turbine height alone, the operation and maintenance facility alone, or a combination of each turbine height and the operation and maintenance facility (Dark Sky Partners 2022:10). If approved by the FAA, the turbine aviation lighting would be controlled by an ADLS that detects when an aircraft is within 25 miles of the turbines. Using this system, the aviation lighting would be off approximately 92% of the time (Capitol Airspace Group 2022) (i.e., total light output would be as modeled under scenario 5, except when an aircraft is nearby).

Obstruction lighting associated with up to five met towers (approximately 15 lights, also required by the FAA-approved ADLS) that would be installed along the periphery of the turbine strings was not included in the modeling for any scenario. The total output from the aviation lighting on these towers would not exceed 45,000 lumens, which represents no more than 2% of the total light output of the project under any scenario. Therefore, the effect of met tower lighting on the results of the model is negligible (Dark Sky Partners 2022).

Under all five scenarios, overhead sky brightness as viewed from the selected observation point at CRMO would increase by less than 1%. Changes in brightness of less than 10% would not be perceptible to human viewers. The greatest impact would occur near the horizon (3 degrees elevation), where night sky brightness would increase by 0.7% under scenario 5 to over 24% under scenario 1 (Dark Sky Partners 2022).

Under all five scenarios, overhead sky brightness as viewed from the selected observation point at Minidoka NHS would increase between 0.5% to 2.2%, depending on the lighting scenario, which would not be perceptible to human viewers. The greatest impact would occur near the horizon (up to 3 degrees elevation), where night sky brightness would increase by 44% under scenario 5 to over 100% under scenario 1 (Dark Sky Partners 2022).

Under conditions where obstruction lighting would remain off (approximately 92%–98% of the time [Capitol Airspace Group 2022; Dark Sky Partners 2022]), there would be no impacts to dark skies as a result of project operation. Under the modeled scenarios, for the remaining 2% to 8% of the time, a detected aircraft would activate the obstruction lighting (i.e., aircraft detected within 25 miles), and thresholds that determine dark sky status would be exceeded (Dark Sky Partners 2022).

Night skies viewed from the selected observation point at Minidoka NHS are significantly brighter due to the existing light pollution from Twin Falls, Jerome, and other communities along the I-84 corridor. Currently for visitors, full dark adaptation is not possible, and the existing light pollution causes significant glare, most notably from the light dome caused by Twin Falls, Idaho (south of the Minidoka NHS KOPs), and lights from the maintenance facility by the Minidoka NHS Visitor Center (near KOP 1). The project is predicted to be visible between 340 and 94 degrees azimuth, or 114 degrees across the horizon. This overlaps with the darkest portion of the horizon (lowest vertical illuminance) as observed from the Minidoka NHS Visitor Center (NPS 2021). The siting of the project in this area would introduce artificial light to the darkest portions of the Minidoka NHS horizon where no substantial impacts currently exist. However, the anticipated impacts for scenario 5 (scenario 5 includes only lighting from the operation and maintenance buildings) are a small percentage of normal nighttime facility operation. The project lighting (when ADLS is illuminated) combined with the existing light domes would effectively surround the park with light along the horizon. The "as needed" management approach (including the ADLS; applicant-committed measures 22 through 24; minimizing the amount of lighting at ancillary structures and where buildings have lighting, using motion sensors to ensure lighting is deactivated at night, unless needed), would result in a smaller light impact than scenario 5, approaching no impact for a large fraction of time (Dark Sky Partners 2022). The ADLS would only illuminate turbines when aircraft are nearby (approximately 2%–8% of the time), and lighting at operation and maintenance buildings, the BESS, and substations would remain off unless needed for unscheduled or emergency nighttime maintenance and would be minimal and directed downward (applicant-committed measures 23 and 24). All unnecessary lighting at the project would be deactivated at night (applicant-committed measure 22). Therefore, the impact to night skies at any given time would likely be less than modeled for scenario 5.

Alternative B with Additional Measures

No additional project-specific mitigation measures are proposed for Alternative B. Applicant-committed measures for night skies are summarized in Table 3.16-11 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.16-11. Mitigation for Night Skies

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
20–24	–	–

Note: All measures are detailed in EIS Appendix 4.

3.16.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would have similar changes in brightness of the night sky as Alternative B, except that nighttime impacts to viewers from KOPs 1, 2, and 16 (Minidoka NHS) on the western edge and viewers from KOPs 12, 13, 14, and 15 (CRMO) would be reduced because of the increased distance to the nearest siting corridor. Impacts to viewers from KOP 17 would be slightly reduced with the removal of the turbine corridors north of the KOP but are anticipated to be similar in all other directions. KOPs are summarized in Tables 3.16-5 through 3.16-7.

3.16.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would have similar effects to night sky conditions to viewers from KOPs as Alternative C. There would be reduced night sky impacts to viewers compared to Alternative B along the western edge of the project at KOPs 1, 2, 4, 10, and 16 and at the eastern edges at KOP 13 and travel routes. Impacts would be slightly lessened from KOP 17 with the removal of the turbine corridors to the west and south of the KOP. KOPs are summarized in Tables 3.16-5 through 3.16-7.

3.16.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would have similar night sky effects as Alternatives C and D. Alternative E would reduce impacts compared to Alternative B to viewers on the eastern edge of the project at KOPs 1, 2, 10, and 16 and on the southern edge of the project at KOPs 3 and 4. KOPs are summarized in Tables 3.16-5 through 3.16-7.

3.16.2.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would have even fewer impacts compared to Alternative B to viewers on the northern edge of the project at KOPs 5, 7, and 8 and on the southeastern edge of the project at KOPs 3 and 4. Night sky impacts would be decreased near the Minidoka NHS KOPs compared to Alternative B, C, and D. The Preferred Alternative would have similar night sky effects as Alternative E. KOPs are summarized in Tables 3.16-5 through 3.16-7.

3.16.2.2.7 CUMULATIVE IMPACTS

The trend for future growth of the Twin Falls metropolitan area and surrounding communities, along with increased renewable energy development in the CRMO and Minidoka NHS nightscapes, would have additive or synergistic effects in combination with the Lava Ridge Wind Project, especially when the wind projects' ADLS are activated during operation. These would add lighting to currently darker portions of the CRMO and Minidoka NHS nightscapes.

3.16.2.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, there would be an irretrievable long-term effect from changes in night sky brightness on the horizon as viewed CRMO and Minidoka NHS (sensitive viewing locations) during the 30-year operation phase (see Section 3.16.2.2.2 for Alternative B Impacts). Although the corridors on the horizon under the Preferred Alternative, would be reduced by half as much as Alternative B, they would likely still increase night sky brightness by greater than 10% (and be perceptible) as viewed from Minidoka NHS under lighting scenario 1 (all project lights on, without use of the ADLS). If the FAA authorizes MVE's implementation of the ADLS, this effect would occur only 2 to 8% of the time. These long-term effects would remain until turbines are removed from the landscape during decommissioning. Short-term effects on night skies would also occur during the up-to-3-year construction phase.

3.16.2.4 Best Management Practices

BMPs applied to the project would help reduce impacts though planning and design as outlined in the BLM's *Night Sky and Dark Environments: Best Management Practices for Artificial Light at Night on BLM-Managed Lands* (Sullivan et al. 2023). These BMPs are not regulations but are recommendations to lessen impacts to night skies. Applicable BMPs would include having a lighting plan prepared by a qualified lighting designer, shielding lights, directing lights, selecting appropriate luminaires, and establishing a lighting and light pollution monitoring program.

3.16.2.5 Compensatory Mitigation

With the implementation of applicant-committed measures (see EIS Appendix 4), no additional measures to minimize impacts to night skies are proposed.

3.16.3 Shadow Flicker

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.17 WATER AND WETLAND RESOURCES

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.18 WILDLIFE

3.18.1 Wildlife Movement (non-game mammals and reptiles)

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.18.2 Big Game Habitats and Populations

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.18-1.

Table 3.18-1. Analysis Approach for Big Game Habitats and Populations

Issue Analyzed in Detail	How would the project affect pronghorn and mule deer habitat and distribution of local (Owinza) populations?
Associated Issues Analyzed in Brief	AIB-54: How would changes in hunter access via new or improved roads affect big game populations? AIB-62: How would the project affect elk habitat and population distribution?
Analysis Area	These analysis areas provide context for how the project could affect mule deer and pronghorn migration routes and stopover areas. These analysis areas consider the broader ranging habits of the Owinza mule deer and pronghorn populations that may be affected by habitat alteration or disturbance and displacement from noise and human activity associated with the project. **Mule deer:** The 4,085-square-mile (2,614,309-acre) analysis area for mule deer (see Figure 3.18-1) is bounded by I-84 and the Snake River (a major boundary to mule deer movement) to the south. This boundary also represents the southern terminus of traditional winter range for mule deer, which increases in importance with winter severity. The eastern boundary of the analysis area generally follows lava landforms within the CRMO south to the Snake River and I-84. The western boundary of the analysis area generally follows the landform associated with the Big Wood River north to Magic Reservoir, westward along Camas Creek and the Camas Prairie, and then northward following Soldier Creek and the South Fork of the Boise River to Emma and Frenchman Creeks. The northern boundary of the analysis area was delineated using the northernmost movement of collared individuals that use winter habitat in the siting corridors, the Big Wood River, and high-elevation topography. Movement beyond this extent in all directions is likely to occur, and the best available information at the time of EIS publication (including migration corridor mapping and IDFG collar data) indicates that this analysis area represents the general geographic extent of the annual range of the Owinza wintering mule deer population (Edelmann et al. 2022a). **Pronghorn:** The 2,358-square-mile (1,508,970-acre) analysis area for pronghorn (see Figure 3.18-2) is bounded by I-84 (a major boundary to pronghorn movement) and large blocks of irrigated cultivated lands to the south. This boundary also represents the southern terminus of traditional winter range for the Owinza population of pronghorn, which increases in importance with winter severity. The eastern boundary generally follows lava landforms within the CRMO. Since collared pronghorn were not recorded using a mapped migration route that follows the northern boundary of the CRMO, it is assumed that the Gooding population that uses the CRMO migration route and the Owinza route (the mapped migration route and stopover areas located in the analysis area) are unlikely to intermix in winter ranges (with the Gooding population using the CRMO migration route likely wintering east of the CRMO) (Bergen 2021b). Similarly, the western boundary south of Magic Reservoir generally follows a lava landform associated with the Big Wood River across which collared pronghorn were not recorded crossing and was identified as the maximum mapped westward movement of collared individuals. The northern boundary of the analysis area was delineated using the northernmost movement of collared individuals and limited availability of suitable summer habitats at higher elevations. Movement beyond these extents in all directions may occur, and the best available information at the time of EIS publication (including migration corridor mapping and IDFG collar data) indicates that this analysis area represents the general geographic extent of the annual range of the Owinza wintering pronghorn population (Edelmann et al. 2022a).
Indicators	Acres of noise and human activity in winter habitat and migration routes (calculated using the area where construction and decommissioning noise would be above ambient sound levels, or within 6.8 miles of the siting corridors as determined by SWCA [2022]). Acres of vegetation disturbance and facilities in winter habitat and migration routes. Miles of new and improved access roads and fences and road density in winter habitat and migration routes. Length of construction and decommissioning duration in years.

Impacts Duration	The life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives, plus the longest estimated reclamation period for native vegetation communities (see Section 3.15.1 [Native Upland Vegetation Communities] in EIS Appendix 15), estimated to last approximately 84 to 86 years (the life of the project and 50 years for vegetation to reestablish after final reclamation).
Data Sources	IDFG mule deer and pronghorn radiotelemetry data (IDFG 2022a, 2022b). IDFG mule deer and pronghorn modeled seasonal habitat (IDFG 2016, n.d. [2022]). IDFG mapped migration movement areas for mule deer (Bergen 2023) and for pronghorn (Bergen 2021a, 2021b). USGS Ungulate Migrations of the Western United States, Volumes 1 and 2 (Kauffman et al. 2020, 2022). Idaho Mule Deer Statewide Management Plan 2020–2025 (IDFG 2019a). IDFG Mule Deer FY2018 Statewide Report (IDFG 2019b). IDFG Pronghorn FY2018 Statewide Report (IDFG 2019c).
Assumptions or Approach	Big game species analyzed for this issue are mule deer and pronghorn, each of which has a unique analysis area. The analysis areas were developed by mapping available radiotelemetry data for annual movement of all collared individual animals recorded near the siting corridors during studies by IDFG (IDFG 2022a, 2022b) (Figures 3.18-1 and 3.18-2). These studies are being undertaken in response to SO No. 3362 (Improving Habitat Quality in Western Big Game Winter Range and Migration Corridors), through which current priority areas were identified and are described in the Idaho Action Plan (IDFG 2022c). Two priority areas intersect the analysis areas for mule deer and pronghorn: the Smoky-Boise Complex Priority Area (northwest of the siting corridors) and the Big Desert-Mountain Valley Complex Priority Area (northeast of the siting corridors) (see Figures 3.18-1 and 3.18-2). Radiotelemetry data included 11 pronghorn tracked between October 2019 and November 2020 (Bergen 2021a), and 27 mule deer tracked between May 2018 and December 2020 (Bergen 2023). Mapped migration route and stopover[39] information is available for mule deer and pronghorn in Idaho (Bergen 2021a, 2023). Radiotelemetry location data and associated sequential movements were mapped as an initial basis for identifying the annual geographical extent of pronghorn and mule deer Owinza populations that use portions of the siting corridors. The analysis areas were further refined with results of an IDFG mule deer (IDFG 2016) and pronghorn seasonal habitat modeling effort (IDFG n.d. [2022]) that identified habitat characteristics that were correlated (associated) with a lower probability of presence in the models. For example, agricultural landcover was negatively correlated with pronghorn presence and thus assumed to be less likely to be used by pronghorn. Habitats with characteristics associated with pronghorn presence were included in the analysis area even if presence data for those specific areas were lacking. IDFG subject matter experts further refined the outer boundaries of the analysis areas by applying local knowledge and topographic characteristics (including known barriers to movement [such as large highways or natural obstacles such as major lava features]). Based on the best available scientific information (recent radiotelemetry data and habitat modeling) and the knowledge of regional subject matter experts, it is assumed that these analysis areas represent an estimation of the annual range (inclusive of winter and summer seasonal ranges and migration routes) of the Owinza populations of mule deer and pronghorn that use winter habitat located in and near the siting corridors (Edelmann et al. 2022a).

[39]Stopovers are areas where animals spend extended time foraging during migration.

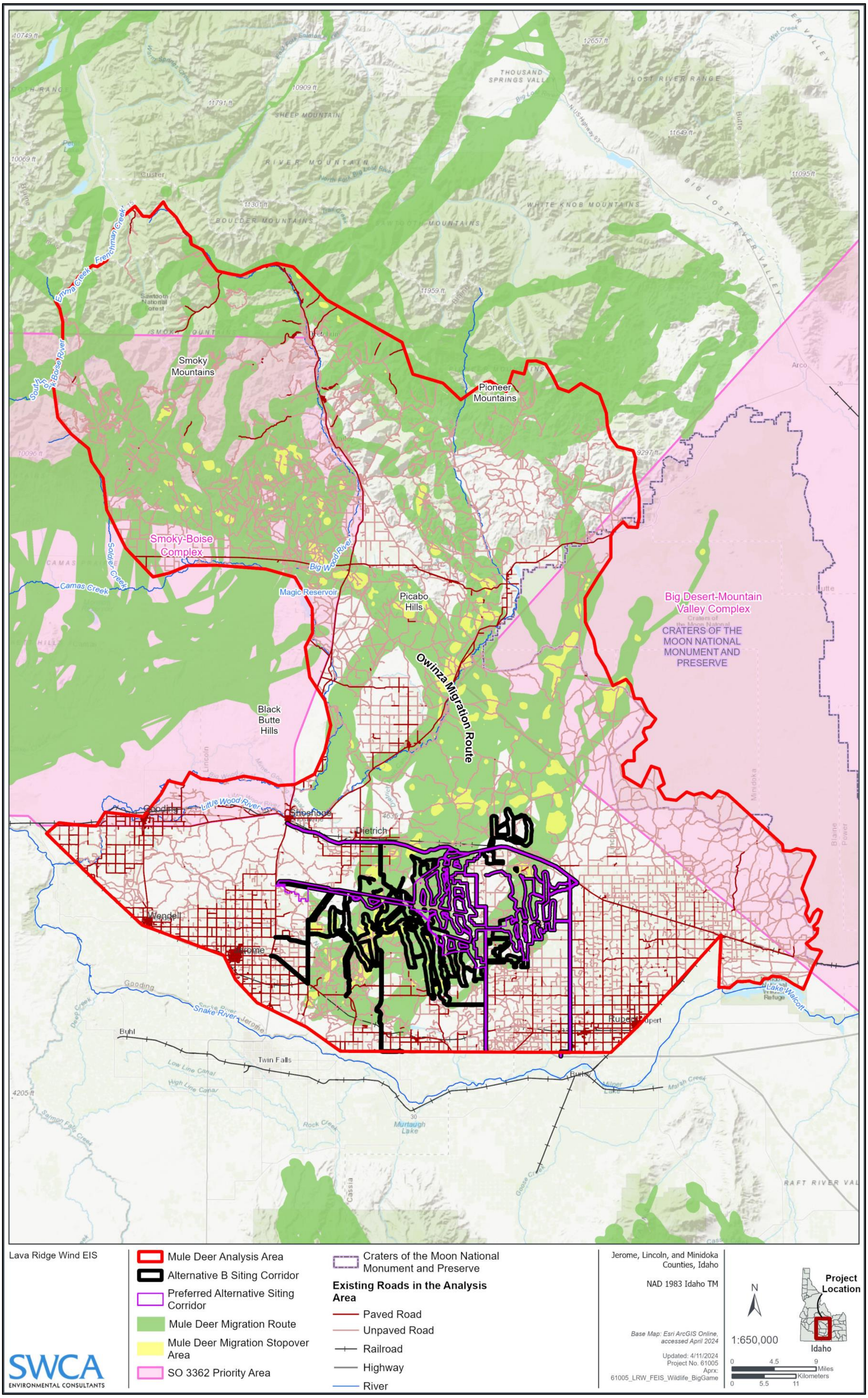

Figure 3.18-1. Mule deer analysis area.

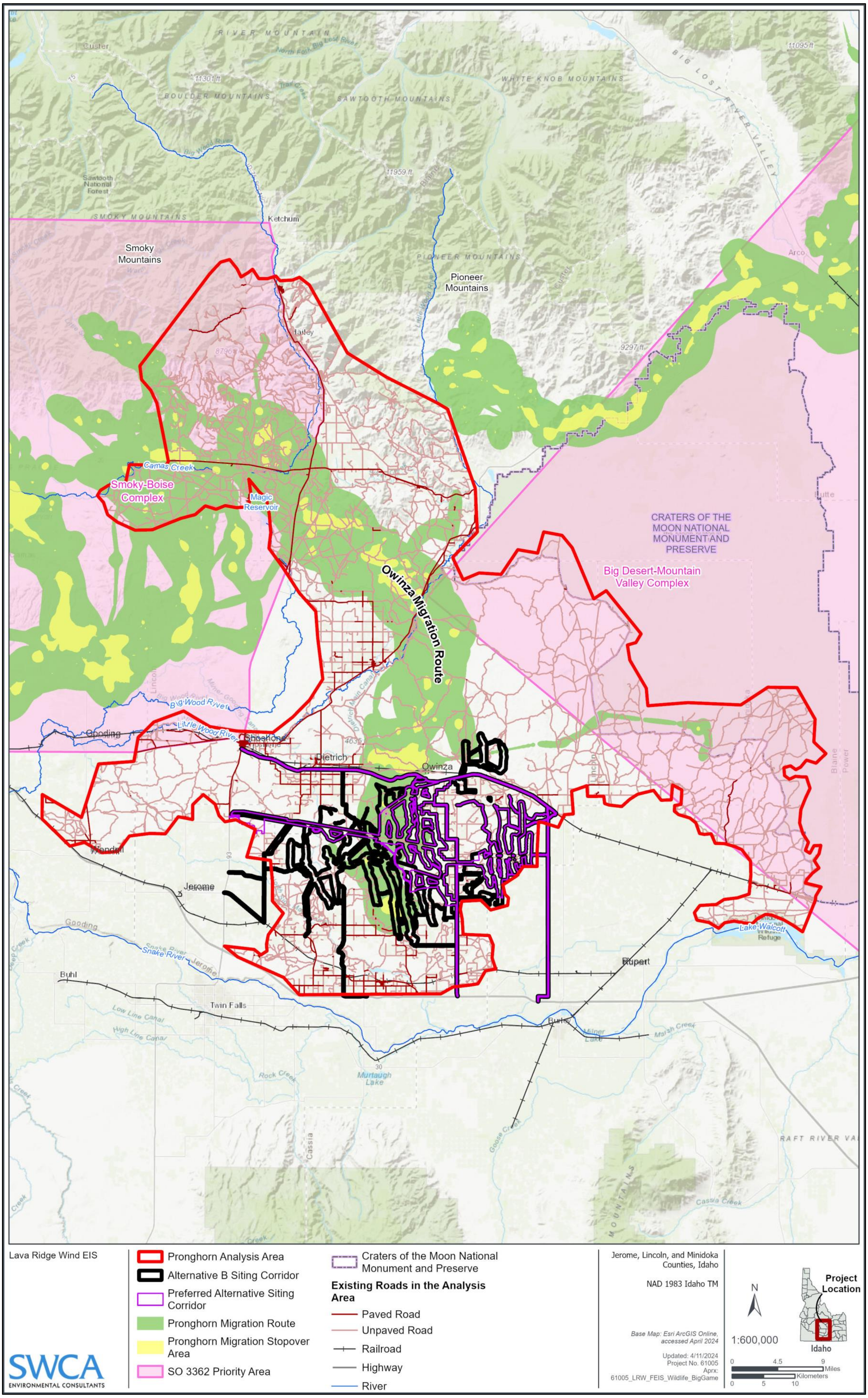

Figure 3.18-2. Pronghorn analysis area.

3.18.2.1 Affected Environment

3.18.2.1.1 MULE DEER

IDFG identifies GMUs and data analysis units (DAUs) for most big game species. A GMU is a management category that is assigned by geographic location. A DAU is representative of the entire seasonal range for an interbreeding population of big game; however, in areas with limited movement and demographic data, DAUs have been delineated by grouping GMUs with similar habitats, weather, and predator communities, which are expected to result in comparable demographics within DAU. The analysis area for mule deer (see Figure 3.18-1) is located almost entirely within the Smoky-Boise DAU and portions of seven GMUs (GMUs 43, 44, 48, 49, 52, 52A, and 53) for which historic mule deer population information is available in IDFG (2019b). Mule deer DAUs are representative of the entire annual range for an interbreeding population of deer (IDFG 2019a). Mule deer in the Smoky-Boise DAU are predominantly migratory, and a migration route (Owinza migration route) and multiple stopover areas within the analysis area have recently been identified by tracking seasonal movements of collared individuals (Bergen 2023) (see Figure 3.18-1). The Owinza mule deer winter herd, largely located within the analysis area, winters in habitat north of I-84 near Eden, Idaho, though others will remain in areas in the Picabo Hills and northeast of Deitrich, Idaho, until later in the winter season before moving south toward I-84. The seasonal migration moves north from winter habitats in the southern portion of the analysis area (through sagebrush steppe habitats near Owinza and Sid Butte) to 1) summer range in the higher elevation habitats in the Pioneer and Soldier Mountains within the Sawtooth National Forest surrounding the Big Wood River Valley or to 2) the foothills of the southern Pioneer Mountains along the Camas Prairie (Bergen 2023). This 815,727-acre route (the Owinza migration route depicted in green in the analysis area in Figure 3.18-1) runs north and south through the analysis area. Approximately 29,540 acres of stopover habitat are present within the analysis area. Other migration routes have been mapped across the region (Bergen 2023).

The southern portion of the analysis area, where the siting corridors would be located, is dominated by arid sagebrush steppe and semi-desert communities, approximately 48% of which has been converted by wildfire and reseeding to nonnative species, lacks notable amounts of sagebrush in the overstory, and has few forbs (IDFG 2019b). The northern portion of the analysis area is dominated by mountain shrub, and mountain big sagebrush communities are common on south-facing exposures of mountain foothills; northern exposures contain higher densities of trees (IDFG 2019a). The analysis area contains both winter and summer habitat for mule deer. In sagebrush steppe, sagebrush and bitterbrush are important components of mule deer winter range that provide forage, security, and thermal cover (IDFG 2019a). Summer habitat includes sagebrush steppe habitats (an important component of summer habitat in central Idaho), such as those in the southern Pioneer Mountains and Picabo Hills (IDFG 2019b). In late spring to early fall, mule deer will consume the mast, leaves, and stems of trees and shrubs, as well as forbs and grasses. In late fall, winter, and early spring, mule deer will consume the leaves and stems of shrubs and trees. Upland vegetation in the siting corridors is described in Section 3.15.1 (Native Upland Vegetation Communities) in EIS Appendix 15. The amassing of excess fat during late spring, summer, and fall is essential for winter survival because individuals may lose up to 20% of their total body weight during an ordinary winter and more during particularly long or severe winters (NRCS 2005). Mule deer in the analysis area generally winter in lower-elevation foothills, sagebrush steppe, and along lower-elevation tributaries of the Big Wood River (IDFG 2019b) within the analysis area. Individual mule deer have been recorded moving into areas south of I-84 and north of the Snake River (Edelmann et al. 2022a).

Since 2010, the greatest cause of recorded mortality for mule deer has been malnutrition, which is a result of harsh winter conditions (IDFG 2019b). Since 1993, deer numbers have generally increased in the analysis area (IDFG 2019b). However, the number of wintering deer using the Picabo Hills has declined in recent years. This decline could be a result of a shift in movement patterns caused by wildfires in the early 1990s that burned the Picabo Hills (in the analysis area) and Thorn Creek (located west of the analysis area) and resulted in high mortality of wintering deer between 1992 and 1993 (IDFG 2019b). Large wildfires have removed native shrubs, grasses, and forbs; burned areas have typically been reseeded for perennial grasses and in some areas for sagebrush (see Section 3.15.1.1 [Native Upland Vegetation Communities Affected Environment] in EIS Appendix 15 and Figures 3.7-1 and 3.7-2 [Fire History] in EIS Appendix 15). When reseeding includes nonnative perennial grasses, these grasses are generally lower quality forage for mule deer (see discussion below for more detail). Early rehabilitation efforts often included the planting of exotic perennial grasses such as crested wheatgrass that provides forage for livestock. More recently, burned areas are typically rehabilitated with native cultivars and shrubs, and in areas of low potential of seeding success, exotic perennial grasses such as crested wheatgrass and Siberian wheatgrass are used.

Mule deer habitat south of Picabo Hills was once dominated by sagebrush-grass communities with a moderate bitterbrush component. As a result of wildfire and grazing, much of the vegetation in this area has been altered with the introduction of nonnative plants dominated by cheatgrass and crested wheatgrass. This has potentially reduced the habitat value for mule deer (IDFG 2019b) because many nonnative species can be less nutritional and/or unpalatable to mule deer and other big game species (NRCS 2005). Lower-quality food resources (e.g., crested wheatgrass and cheatgrass) may provide valuable forage if easy to obtain in large quantities (Litt and Pearson 2013). Data from studies examining the value of crested wheatgrass plantings for mule deer suggest this plant can provide valuable forage if it does not displace critical browsing resources (Clements and Young 1997; Litt and Pearson 2013). These grasses may make up a large proportion of mule deer diets when they are accessible during winter and during periods of new plant growth before forbs are abundant (Austin et al. 1983; Austin et al. 1994). As a result of the increased volume of low-quality food resources necessary to support a single individual, the landscape in the analysis area may support fewer animals than those dominated by native forage species, and areas containing native plant communities may be more important for mule deer.

The southern portion of the analysis area currently maintains a small resident deer population (IDFG 2019b). This area is also important winter range for mule deer that use summer habitats to the north. Use of the southern portion of the analysis area by mule deer was first noted in the early 1980s following extensive fires and loss of sagebrush habitat in historically more commonly used winter habitats located to the west and east of the CRMO (IDFG 2019b). The number of wintering deer in this area varies considerably depending on winter severity and snow depths: in winters of 1985–1986 and 1992–1993, thousands of mule deer moved into this region, and during the severe winter of 2001–2002, large numbers of mule deer were again present (primarily concentrated east of Jerome, in the analysis area) (IDFG 2019b). These large influxes of wintering mule deer resulted in a substantial number of deer-vehicle collisions on I-84 and large number of depredation complaints (IDFG 2019b). A 2022 IDFG 1-day aerial reconnaissance survey of mule deer conducted near the siting corridors counted approximately 1,560 mule deer; however, because the survey was not formal and results are raw counts, the methodology does not enable an accurate population estimate (Edelmann et al. 2022b). Based on historical and current information sources, this portion of the analysis area appears to provide important wintering habitat for mule deer during severe winters when preferred winter habitats are not available (Edelmann et al. 2022a).

The Owinza mule deer population that winters in the analysis area commingles with other migratory populations of mule deer in summer ranges, such as the Pioneer Reservoir, Bennett-Teapot, and Blacks Creek-Danskin populations (Berg and Bergen 2020a, 2020b, 2020c). These other migratory populations have been recorded using winter ranges west of the analysis area in the Bennet and Black Butte Hills; Bennett Hills contains one of the highest densities of wintering deer in Idaho (IDFG 2019b). One collared mule deer was recorded using winter habitats in the analysis area one year and winter habitats in the Bennett Hills region the following year; therefore, annual movement between these regions may not be uncommon (Edelmann et al. 2022a). The Blair fire burned almost 40,000 acres of winter habitat in this region in 2011 (IDFG 2019c). Current land use conflicts in this region are similar to those described for the analysis area (see discussion below); additionally, motorized access to private lands in the Bennett Hills winter range is presently unregulated and may be affecting deer use of available habitat (IDFG 2019b).

Land use conflicts in mule deer habitat in the analysis area include excessive use of forage on winter ranges and riparian area degradation (IDFG 2019b). In GMU 45 (outside the analysis area) and GMU 52 (partially in the analysis area), more than 16,000 deer and more than 5,000 elk share winter habitat with an unknown number of pronghorn, along with thousands of domestic cattle and other livestock (IDFG 2019c), which can increase competition for available forage and/or more high-quality habitat and may limit productivity for mule deer populations. Additionally, outdoor recreation (including motorized use) is increasing in popularity, leading to year-round human activity that may disturb mule deer throughout available habitats (IDFG 2019b).

Existing and Future Trends and Actions

Human disturbance in combination with existing and future trends and actions have and will continue to influence mule deer habitat in the analysis area through habitat alteration and fragmentation, introduction of invasive species, and conversion of open space to cultivated lands or rural residential. Approximately 730,929 acres (28%) of the analysis area are dominated by nonnative plant species, are cultivated lands, are disturbed (consist of roads and other types of development), are existing ROWs (i.e., subject to ongoing and future surface- and vegetation-disturbing activities), or are proposed for other renewable energy development projects (Figure 3.18-3). These lands have been modified or affected in such a way as to reduce habitat value for mule deer and availability of forage is a limiting factor for populations. An additional 991,326 acres (37%) of the analysis area have been affected by wildfire, vegetation treatments, and seeding projects, which may reduce habitat quality until these areas revegetate. This includes 945,733 acres of previously burned areas that have been reseeded, mostly with perennial grasses (both native and nonnative) and/or seeded/planted with desirable shrubs such as big sagebrush and bitterbrush, which may improve habitat conditions for mule deer over time (see Figures 3.7-1 and 3.7-2 in EIS Appendix 15).

Approximately 1,500 miles of existing paved roads and 5,644 miles of existing unpaved roads occur in the analysis area. These roads present a current and ongoing source of direct mortality via vehicle strikes and fragment habitat, whereas larger roads (such as highways) may present major barriers and restrict movement across the analysis area. U.S. 20, U.S. 26, and ID 24, along with ID 75, present major east-west and north-south barriers to movement across relatively intact natural landscapes in the analysis area. Another 174 miles of the BNSF railroad is also present in the analysis area, contributing to habitat fragmentation and disturbance, though not likely presenting a major barrier to mule deer movement. The effects of road density on big game can vary by species; however, areas with road density greater than 2 miles per square mile exceed thresholds for many terrestrial wildlife species, including smaller bodied mammals (Trombulak and Frissell 2000; Wisdom et al. 2004), and a road density threshold of 1.0 miles per square mile has been determined to be the maximum for a naturally functioning landscape containing sustained populations of large mammals (Forman and Hersperger 1996). Existing road and railroad density is 1.75 miles per square mile within the analysis area and 1.57 miles per square mile within the mapped Owinza mule deer migration route.

Fencing can also contribute to habitat degradation and can reduce the ability of mule deer to move between seasonal habitats. A 2020 study conducted in Wyoming found that fences altered movement behavior 40% of the time a fence is encountered (Xu et al. 2020), which can keep wildlife from accessing resources and reduce habitat use effectiveness (Jones et al. 2019). As described in Section 3.18.1.2.2 (Wildlife Movement, Alternative B [Proposed Action] in EIS Appendix 15), impermeable fences (such as chain-link security fencing) can completely block most wildlife movement through the fenced area (Said et al. 2016; Woodroffe et al. 2014). Although semipermeable fences (such as wire fencing used for livestock) allow a degree of permeability, they still may reduce movement efficiency and compromise the ability for wildlife to access resources (Cozzi et al. 2013; Jakes et al. 2018). There are a minimum of 1,277 miles of mapped fences in in the analysis area; this is likely an underestimation because not all fences are mapped. Most fences on BLM-administered lands within the analysis area have likely been constructed to wildlife-friendly BLM specifications for wire type (smooth vs. barbed) and wire heights/spacings to accommodate movements by big game species. Although much of the mapped fences occur in open areas for livestock control, it assumed that mapped fences are also present along roads to keep livestock out of traffic and would commensurately contribute to the reduced permeability of these features to mule deer movement across the analysis area.

Ongoing and future efforts related to SO3362 and the Idaho Action Plan (IDFG 2022c) within the Smoky-Boise Complex and the Big Desert-Mountain Valley Complex Priority Areas will contribute to big game winter and migratory habitats across the region; however, current projects are located outside the analysis area.

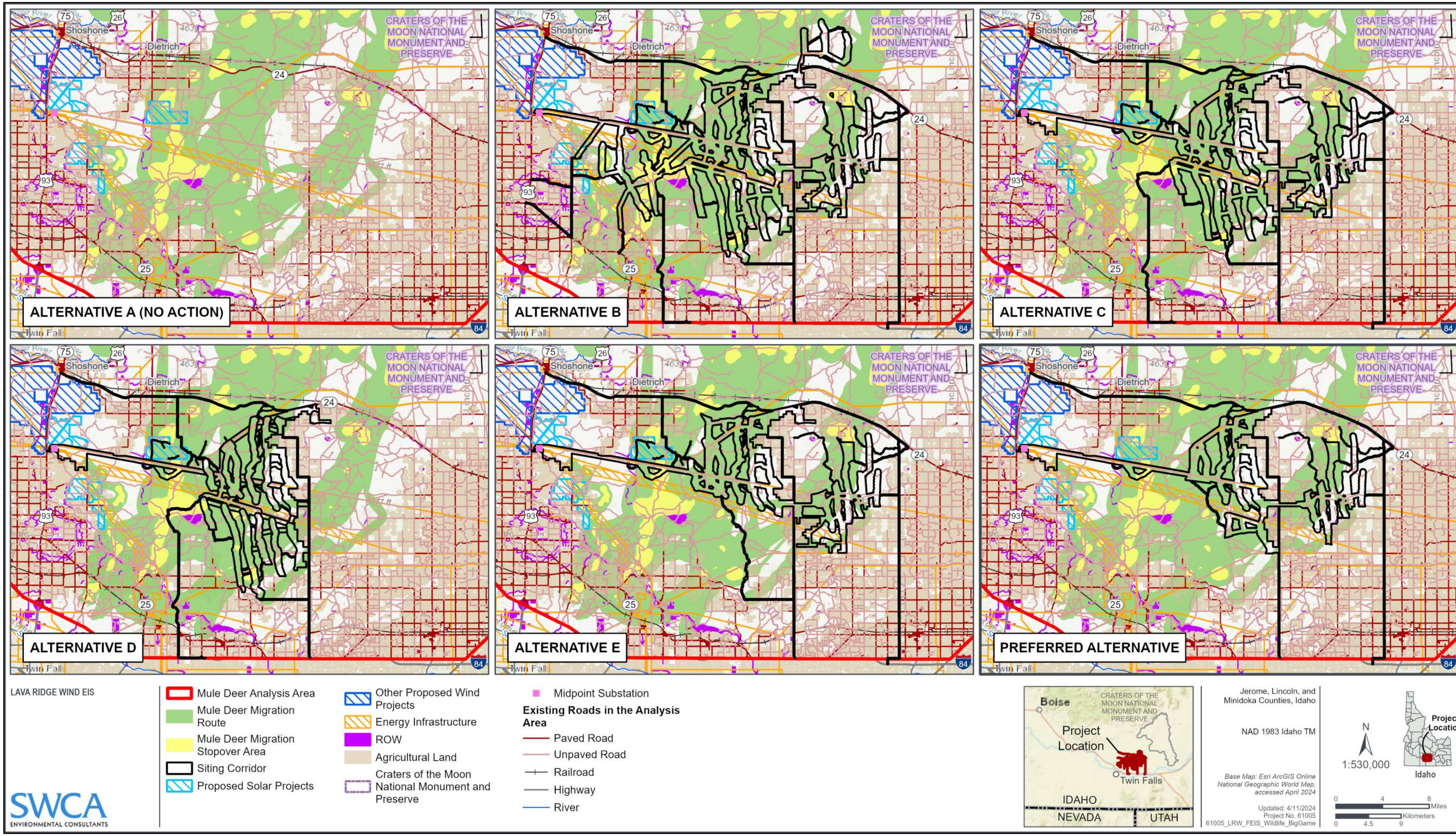

Figure 3.18-3. Existing and planned disturbance in the mule deer analysis area.

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3.18.2.1.2 PRONGHORN

The analysis area for pronghorn (see Figure 3.18-2) is located within portions of GMUs 44, 48, 49, 52, 52A, and 53 for which pronghorn population information is available in IDFG (2019c). Pronghorn in the analysis area are largely migratory, though a small population of resident pronghorn are restricted to an area south of the analysis area between I-84 and the Snake River (IDFG 2019c).

Individual pronghorn can demonstrate wide variation in movement between summer and winter ranges, though often show stronger fidelity to summer habitat than to winter habitat and have been observed using the same habitat across seasons (Collins 2016). Generally, pronghorn occupy higher elevations during the summer and move to lower elevations during the winter. Snow depth and temperature influence migration distances, winter habitat size, elevation of winter habitat use, and winter habitat location (Collins 2016). The northern portion of the analysis area is comprised of the Camas Prairie, the Big Wood River Valley, and low foothills of the Smoky Mountains. The southern portion of the analysis area is the same as that described above for mule deer, though it is more closely restricted by irrigated cultivated lands (IDFG n.d. [2022]) and I-84 (which presents a major movement barrier to pronghorn) (Edelmann et al. 2022a). Winter habitat is largely restricted to the southern central and western portions of the analysis area. Summer habitat for pronghorn is present and is generally restricted to the northern portion of the analysis area. Winter and summer habitats may overlap in areas that provide appropriate resources and may be used year-round (see Figure 3.18-2). Fawning pronghorn habitat has not been mapped but is assumed to occur in the analysis area (Edelmann et al. 2022a) though not in the siting corridors, which represent winter habitat.

Migration routes have recently been identified by tracking seasonal movements of collared individuals (Bergen 2021a). The Owinza pronghorn winter herd, largely located within the analysis area, migrates by weaving through lava fields below the Mount Bennett Hills and further to the east in the Snake River Plain in Idaho. The seasonal migration moves north from winter habitats in the southern portion of the analysis area, traversing the Picabo Hills into the eastern side of Camas Prairie and west side of the Wood River Valley, to summer range, which is shared with members of the Gooding pronghorn herd to the west (Bergen 2021a). This 306,701-acre route (the Owinza migration route depicted in green in the analysis area as a Pronghorn Migration Route in Figure 3.18-2) runs north and south through the analysis area. Approximately 32,011 acres of stopover habitat within the Owinza migration route are present within the analysis area.

Pronghorn typically use habitats dominated by grasses and forbs, with interspersed low shrubs that provide long-range visibility for predator avoidance, and require readily accessible water (Howard 1995). Shrubs are important forage resources in winter habitats (Yoakum 1981). Generally, much of the pronghorn habitat on public land in the analysis area is in poor condition, largely from invasion of nonnative species such as cheatgrass after wildfires (IDFG 2019c). Pronghorn populations in the analysis area have increased moderately from lows observed in 1993, though populations in the southern portion of the analysis area have remained low (IDFG 2019c). In the analysis area, the Camas Prairie contains important summer habitat for a number of pronghorn populations that congregate to forage on grasses, forbs, shrubs, and many of the dryland cultivated crops, primarily alfalfa. The availability of high-quality forage has contributed to high fawn survival rates (IDFG 2019c). Recently, population declines have been observed on the Camas Prairie, likely related to high winter mortality during the severe 2016–2017 winter (IDFG 2019c). In severe winters, pronghorn are anecdotally reported congregating in larger numbers along I-84, particularly during the winter of 2016–2017 (IDFG 2019c). As discussed above for mule deer, the southern portion of the analysis area contains winter habitat for pronghorn that has been converted by wildfire to be largely dominated by nonnative species with little sagebrush in the overstory and few forbs, and available forage is often shared with large numbers of mule deer, elk, and domestic livestock (IDFG 2019c). A 2022 IDFG 1-day aerial reconnaissance survey of pronghorn conducted near the siting corridors counted approximately 250 to 300 pronghorn; however, because the survey was not formal and results are raw counts, it is not a suitable methodology to provide an Owinza pronghorn population estimate (Edelmann et al. 2022b). Based on historic and current information sources, this portion of the analysis area appears to provide important wintering habitat for pronghorn during severe winters when preferred winter habitats are not available (Edelmann et al. 2022a). Forage quality, fawn predation, and availability of suitable habitat are the primary population-limiting factors for pronghorn (IDFG 2019c; Yoakum 1981).

Similar to mule deer, other populations of pronghorn that comingle in the summer (in the Camas Prairie region) with the Owinza population of pronghorn that uses winter habitat in the analysis area have been recorded using winter habitats west and east of the analysis area, much of which has also been altered by wildfire (IDFG 2019c). Given the variations in annual movement observed in pronghorn, movement between these regions may not be uncommon (Edelmann et al. 2022a). Current land use conflicts in these regions are similar to those described for the analysis area (see discussion below).

Existing and Future Trends and Actions

Pronghorn and their habitats have been experiencing similar land use conflicts as those described above for mule deer. Existing and future trends and actions have modified and will continue to modify or affect the condition of modeled pronghorn seasonal habitats. Approximately 398,744 acres (26%) of the analysis area are dominated by nonnative plant species, are cultivated lands, are disturbed (consist of roads and other types of development), are existing ROWs (i.e., subject to ongoing and future surface- and vegetation-disturbing activities), or are proposed for other energy development projects (Figure 3.18-4). These lands have been modified or affected in such a way as to reduce habitat value for pronghorn and availability of forage is a limiting factor for populations. An additional 819,880 acres (54%) of the analysis area have been affected by wildfire, vegetation treatments, and seeding projects, which may reduce habitat quality until the areas revegetate. This includes 761,778 acres of previous burn areas that have been reseeded, mostly with perennial grasses (both native and nonnative), which may improve habitat conditions for pronghorn over time (see Figures 3.7-1 and 3.7-2 in EIS Appendix 15).

Approximately 478 miles of existing paved roads, 3,707 miles of existing unpaved roads, and 90 miles of the BNSF railroad occur in the analysis area. Paved and unpaved roads present a current and ongoing source of direct mortality via vehicle strikes and fragment habitat, whereas larger roads (such as highways) may present major barriers and restrict movement across the analysis area. U.S. 20, U.S. 26, and ID 24, along with ID 75, present major east-west and north-south barriers to movement across relatively intact natural landscapes in the analysis area and the identified Owinza migration route (see Figure 3.18-4). As stated in Section 3.18.2.1.1 for mule deer, areas with road density greater than 2 miles per square mile exceed thresholds for many terrestrial wildlife species, and a road density threshold of 1.0 miles per square mile has been determined to be the maximum for a naturally functioning landscape containing sustained populations of large mammals. Existing road and railroad density is 1.77 miles per square mile within the analysis area and 1.65 miles per square mile within the mapped Owinza pronghorn migration route.

Effects of fencing discussed for mule deer also apply to pronghorn. Specific to pronghorn, even semipermeable livestock fencing can present a movement barrier because pronghorn tend to attempt to pass under fences rather than over (Jones 2014; Jones et al. 2018). There are a minimum of 1,203 miles of mapped fences the analysis area, and some segments of these fences have been modified to have a smooth bottom wire to accommodate pronghorn movement.

Ongoing and future efforts related to SO3362 and the Idaho Action Plan (IDFG 2022c) within the Smoky-Boise Complex and the Big Desert-Mountain Valley Complex Priority Areas will contribute to big game winter and migratory habitats across the region; however, current projects are located outside the analysis area.

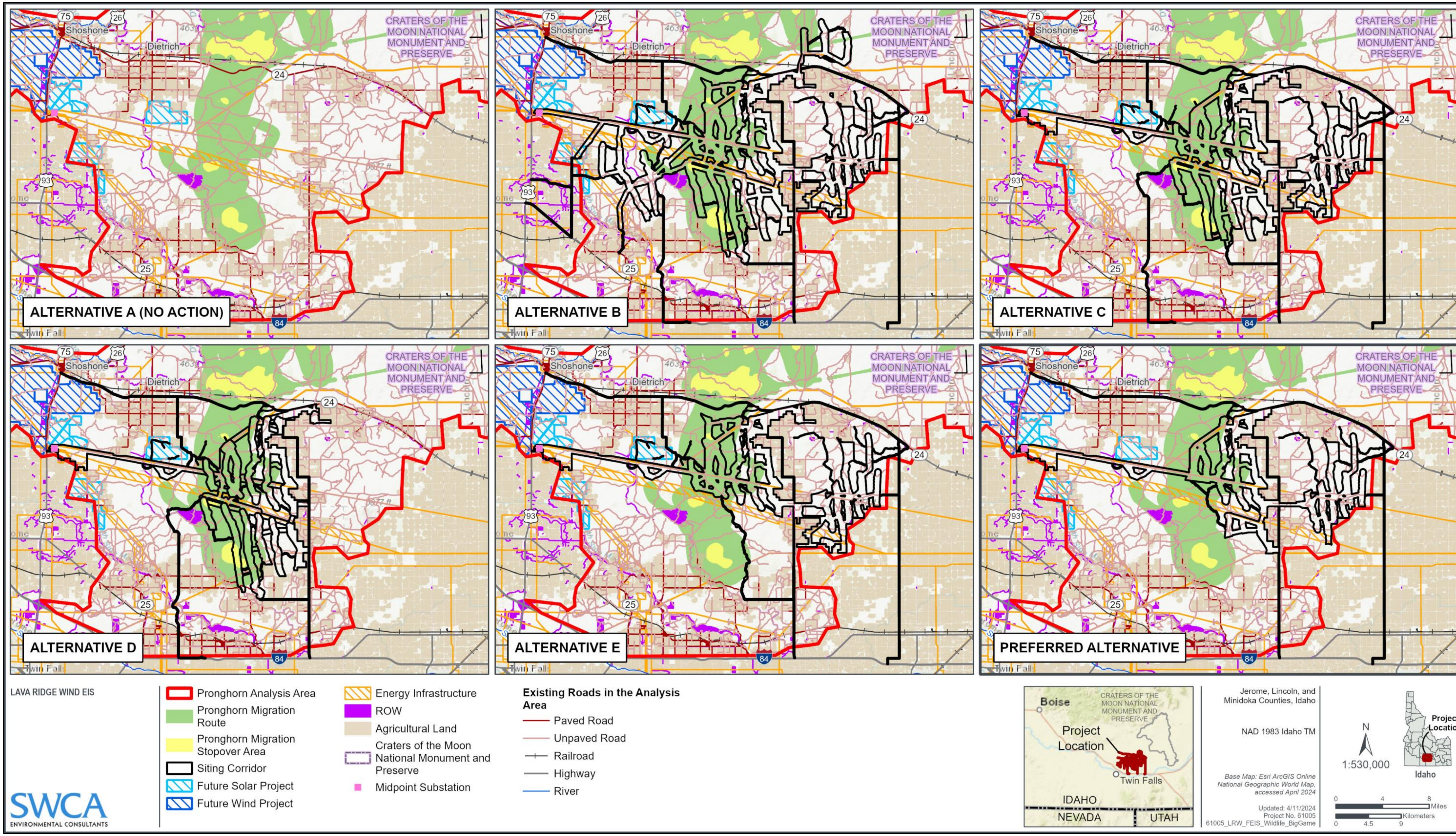

Figure 3.18-4. Existing and planned disturbance in the pronghorn analysis area.

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3.18.2.2 Impacts

3.18.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and big game habitats and Owinza populations would only be affected by existing and future trends and actions.

3.18.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Project activities that would impact mule deer and pronghorn include human activities associated with project construction and operation (e.g., presence of humans, noise, vehicle use, construction equipment, maintenance activities) and ground disturbance that would remove or alter habitat. The construction and decommissioning schedule under this alternative would occur in three subphases across 2 years for construction and 2 years for decommissioning within the Star Lake grazing allotment, so that construction occurs in approximately one third of the Star Lake grazing allotment at any given time (see Figure 2.4-3). For areas outside of the Star Lake grazing allotment, construction activities could occur at any time outside of seasonal wildlife restrictions during the 2-year construction phase and 2-year decommissioning phase.

Wildlife Movement: Overall, landscape-scale effects on ungulate movement are unknown (AWWI 2019), though fencing has been shown to alter movement patterns for mule deer and pronghorn (Xu et al. 2020) and fencing may inhibit pronghorn from reaching areas used during harsh winter events. Surface disturbance can also result in avoidance of migratory routes for ungulate species (Sawyer et al. 2020). Movement of mule deer and pronghorn through the analysis area would be affected by construction of 395 miles of temporary fencing (during construction and decommissioning). Temporary fences could be constructed throughout the siting corridors (see Figures 3.18-3 and 3.18-4). As per BLM-required measure Y (see Table App4-3 in EIS Appendix 4), fence design would follow the BLM fencing handbook H-1741-1 (BLM 1989), which specifies maximum fence heights and minimum bottom wire heights and associated spacings to facilitate more efficient passage of wildlife. MVE would install the minimum amount of fencing needed to ensure the safety and security of project components (applicant-committed measure 43). During operations, fencing would be limited to chain link fencing around infrastructure such as substations. Limited temporary fencing may be required intermittently and at localized sites, if necessary during repair activities. The removal of temporary fences after construction would reduce the displacement effects for mule deer and pronghorn during operations and would increase the permeability of the landscape for local and migratory movement.

Additionally, because roads are often fenced to keep livestock off them, when combined with traffic and human noise and activity associated with typical road use, roads may also present greater barriers to movement than fences would alone. Given this, roads may be particularly challenging for pronghorn movement along the pronghorn Owinza migration route and may present additional barriers for mule deer along the mule deer Owinza migration route. Roads also facilitate human access into habitat, and vehicles may directly kill or injure individuals from vehicle strikes. The density of roads can be connected to degrees of human activity and noise disturbance and habitat fragmentation (Trombulak and Frissell 2000). Approximately 486 miles of new and 147 miles of improved roads would be constructed. This would increase the road density from existing conditions to 1.87 miles per square mile in the mule deer analysis area, to 1.93 miles per square mile in the mapped Owinza mule deer migration route, to 1.98 miles per square mile in the pronghorn analysis area, and to 2.12 miles per square mile in the mapped Owinza pronghorn migration route. Road density in all habitat types exceeds the 1-mile-per-square-mile threshold identified as the maximum for a naturally functioning landscape (which is also the case under current conditions), and road density in mule deer and pronghorn habitats would nearly meet (in mule deer and pronghorn winter habitat and mule deer migratory routes) or exceed (in pronghorn migratory routes) the 2-mile-per-square-mile threshold for many terrestrial wildlife species. The increase in injury or mortality due to vehicle strikes along new and improved roads would be commensurate with the level of use and speed at which vehicles are travelling along the road.

Approximately 812,882 total vehicle trips would be required during construction (a combination of passenger and heavy vehicles), with an average of 7,721 trips per week (1,103 trips per day) (see Tables 2.4-1 and 2.4-3). Traffic on project roads would be highest during construction and decommissioning. Public access on these roads would be restricted during construction, and public use is not expected to substantially increase from the existing level of use, but the impact of the project on the future level of activity on these roads is unknown. The new and improved roads would be open to public use following construction, which could increase the level of motorized access for hunters and other recreationalists, which may either directly kill mule deer and pronghorn (via vehicle strikes or hunting [see Section 3.12 (Recreation) in EIS Appendix 15 for more detail]) or disturb or displace individuals due to human noise and activity. The BLM may choose to leave roads in place at project completion, and therefore the effects of the roads would be permanent. Although new and improved project roads could increase public use and traffic on those roads, public use is not expected to substantially increase from the existing level of use. The miles of new road in mule deer and pronghorn habitats are summarized in Table 3.18-2.

Mule deer and pronghorn have relatively high site fidelity (the tendency of an animal to return to previously visited locations) (Morrison et al. 2021). Research indicates that presence of wind turbines may reduce individual animals' fidelity to sites near the turbines (Milligan et al. 2023). Recent research studying the movement patterns of translocated populations of bighorn sheep has indicated that migratory movements of ungulates may be learned behaviors (Jesmer at al. 2018). Human noise and activity during construction and decommissioning could result in avoidance of existing migratory routes between winter and summer ranges for mule deer and pronghorn.

A recent study of pronghorn movement through a new wind energy facility in Wyoming documented pronghorn 1) selecting migration routes closer to constructed turbines and moving more slowly in the fall, while 2) selecting migration routes further from constructed turbines and moving more quickly in the winter and spring, which indicate that the presence of turbines has a greater effect on spring migratory movements (Milligan et al. 2023). Additionally, stopover sites farther from constructed turbines were used more than stopover sites closer to constructed turbines (Milligan et al. 2023). If mule deer or pronghorn populations also avoid the siting corridors during operations, the potential for loss of existing population-wide migratory behavior would increase, though the degree to which this could occur is unknown.

MVE's applicant-committed measures to minimize road lengths and widths (measure 4) and encourage construction workers to carpool (measure 39) would minimize road construction and potentially minimize traffic. Project personnel during all project phases would be required to drive 25 mph or less on non-public project roads, be alert for wildlife, and use additional caution in low-visibility conditions when driving any vehicle (applicant-committed measure 33). Compliance with these measures would be enforced via the processes outlined in the ECMP (measure 6). These measures would minimize but not eliminate effects to big game from roads and traffic.

Habitat loss and alteration: Pronghorn responses to development are highly variable and are often influenced by conditions not directly related to energy development (such as severe winter weather or hunting pressure) (Beckmann et al. 2016; Taylor et al. 2016). Recent studies in Wyoming documented that pronghorn avoid areas with new wind turbine development in their winter range (Smith et al. 2020) and select stopover habitats further from turbines in the winter and spring (Milligan et al. 2023). A North Dakota study documented lower pronghorn abundance in areas near roads and oil and gas development

(Christie et al. 2015). A long-term (15-year) study of pronghorn avoidance of infrastructure and displacement from winter habitats in an expanding oil development observed that avoidance behaviors increased over time and that displacement varied between 0.25 and 0.50 mile (Sawyer et al. 2019). Wintering pronghorn already experience high energy demands and increased mortality rates, and development pressure in winter habitats would increase stress and avoidance behavior of areas of new development, indirectly reduce available habitat, and increase energy losses and mortality. Additionally, avoidance of stopover habitats close to wind turbines in the spring could result in the loss of important foraging habitats during sensitive time periods (such as gestation) and reduce productivity.

Mule deer responses to development include avoidance and changes in temporal behavior patterns. The distance that mule deer are displaced by the presence of infrastructure and human noise and activity reported in literature is highly variable (0.5 mile [Northrup et al. 2015] to 0.6 mile [Sawyer et al. 2017] to greater than 1.9 miles [Sawyer et al. 2006]). In Wyoming, studies show that mule deer have avoided active oil drilling and construction activities to a greater degree than producing oil wells (which have less noise and activity) (Northrup et al. 2015). Habitat use by mule deer during migration has been shown to be reduced when the surface disturbance reaches 3%, and use was highly unlikely in areas with greater than 10% surface disturbance (Sawyer et al. 2020). In one 17-year study, mule deer demonstrated avoidance of oil and gas development consistently during the study period, not showing habituation to the presence of development, though the magnitude of avoidance decreased during severe winters (Sawyer et al. 2017). Similar to pronghorn, increased stress and avoidance behavior of areas of new development by mule deer would indirectly reduce available habitat and increase mortality during the winter.

There is little available information regarding the effects of wind development on pronghorn and mule deer; however, both species generally demonstrate avoidance of areas of development, and habituation to presence of human disturbance is not apparent. Therefore, it can be assumed that avoidance of development related to noise and human activity that are audible or visible beyond the project ground disturbance footprint would contribute to long-term habitat losses for both species beyond the project ground disturbance footprint. Additionally, the presence of turbines on the landscape may contribute to avoidance behaviors and loss of habitat near constructed turbines for the 30-year operation phase.

Ground disturbance for work areas and infrastructure would remove vegetation that provides forage and cover for mule deer and pronghorn until these areas are successfully reclaimed. Approximately 6,740 acres of habitat would be disturbed by work areas (and may remain at some level of disturbance for the life of the project), and 2,374 acres would be replaced by infrastructure for both species. For migrating pronghorn that use the Owinza pronghorn migration route, approximately 111 acres of stopover habitat would be disturbed by work areas and 39 acres would be replaced by project infrastructure. For migrating mule deer that use the Owinza mule deer migration route, approximately 515 acres of stopover habitat would be disturbed by work areas and 181 acres would be replaced by project infrastructure. As a result of loss of forage in these areas, the risk of depredation of agricultural crops near the siting corridors by displaced big game may increase. Disturbance and/or loss of available forage and cover as a result of the project would add to existing levels of habitat disturbance, and further reduce the ability of the landscape to support populations of mule deer at current levels.

MVE's applicant-committed measures to minimize work areas and infrastructure areas (measure 1) and use previously disturbed areas where feasible (measure 17 and BLM-required measure E) would minimize ground disturbance and habitat alteration. Disturbed areas would be restored to the pre-disturbance landforms and desired plant community at final reclamation (BLM-required measure P). These measures would minimize but not eliminate direct and indirect effects to wildlife habitat that could influence their movement. Decommissioning and reclamation of disturbed areas would allow for previously displaced Owinza mule deer and pronghorn populations to potentially reestablish use of habitat within 50 years of final reclamation (i.e., when native vegetation communities have reestablished).

Noise: Noise can alter behavioral patterns of animals (Mallord et al. 2006), though responses to noise depend on the intensity of perceived threats rather than the intensity of noise (Bowles 1995). A less-obvious effect of noise is acoustic masking, in which increased background levels of noise may inhibit the perception of sounds and result in reduction in alertness, disruption in behaviors (sleeping), and increased volume of vocalizations (Brumm and Slabbekoorn 2005; Patricelli and Blickley 2006; Warren 2006). Much of what is known about how noise affects ungulate behavior results from studies on aircraft disturbance (Harrington and Veitch 1991; Krausman 1998; Landon et al. 2003; Maier et al. 1998; Weisenberger et al. 1996) and has been shown to alter ungulate behavior by increasing vigilance (Maier et al. 1998) and inducing flight response and habitat displacement (Harrington and Veitch 1991; Krausman 1998), which may result in reduced fitness of individuals. Several studies on noise disturbance on ungulate species, including mule deer and pronghorn, have been conducted, and although no specific threshold has been identified, the studies show that wildlife responses begin at approximately 40 dBA (Shannon et al. 2016). A recent study of mule deer habitat use on a natural gas field indicates that use decreases under high noise conditions of 77 decibel relative to isotropic gain (Kleist et al. 2021). A study of Sonoran pronghorn responses to noise on a military training range in Arizona indicates that pronghorn use decreased in areas with greater noise (more than 55 dB) (Landon et al. 2003).

Noise during project construction, operation, and decommissioning was modeled, as described in SWCA (2022). Blasting noise would be perceptible farther away than general construction noise, although it is estimated to meet "quiet" standards identified for greater sage grouse[40] at 3.1 miles from the blasting site and would occur intermittently (no more than twice per day during the 2-year construction phase). A list of typical equipment for project construction and the estimated noise levels are detailed in SWCA (2022). The area of general construction noise (i.e., the area within 6.8 miles of the siting corridors) includes areas where blasting noise would be loud enough to startle mule deer or pronghorn; this area would be much closer to the siting corridors than the full distance at which noise would be detected over baseline levels. It is also assumed that the presence of humans and equipment would result in visual disturbance. Increased noise (including blasting) and visual disturbance from human activity would likely displace mule deer and pronghorn from the active construction areas for the duration of the activities (2 years each for construction and decommissioning). Displacement of mule deer and pronghorn during construction (and operation when maintenance construction-type work may occur) could occur in the area where noise would be elevated from very quiet baseline levels (within 6.8 miles of the siting corridors) and where human activity would be visible (likely at distances less than 6.8 miles of the siting corridors). Since human noise and activity are not anticipated to occur across all siting corridors at the same intensity for the duration of construction, the degree of potential displacement and behavioral alteration of mule deer and pronghorn would also likely change across time and space in response to changes in location, duration, and intensity of construction activities throughout the 2-year construction phase.

Therefore, not all winter and migratory habitat within the area of general construction noise would be affected equally for the full 2 years of construction. Displacement from human noise and activity would be most disruptive for mule deer and pronghorn during the winter and during migration when the Owinza populations of both species are present at greater densities within the area of general construction noise. Behavioral alterations from noise and visual disturbance would result in reduced fitness of individuals if animals do not spend adequate time foraging and/or are displaced from winter habitats containing suitable forage. The risk of winter mortality increases if animals are displaced from winter habitats for enough time or during a severe winter when resources within the disturbance area are more critical to survival.

The project would be constructed (and decommissioned) following subphases for the Star Lake grazing allotment shown in Figures 2.4-3. The subphasing would concentrate human noise and activity from

[40] No equivalent threshold for mule deer or pronghorn has been identified; therefore, the threshold for greater sage-grouse (BLM 2015a) is used.

construction (and decommissioning) in North Star Lake, then South Star Lake, then West Star Lake. As construction (and decommissioning) proceeds into the South and West Star Lake subphases, the intensity of this source of indirect disturbance in North Star Lake would reduce. Since these activities would occur year round, the potential for displacement of mule deer and pronghorn would occur at any point in the year, but effects would most likely result in impacts during sensitive periods, such as during migration and through the winter. In the mule deer analysis area, 799,673 acres (31%) of winter habitat would be located in the area of general construction noise, 299,613 acres (37%) of which would be located within the Owinza mule deer migratory corridor. In the pronghorn analysis area, 564,161 acres (37%) of winter habitat would be located in the area of general construction noise, 107,284 acres (35%) of which would be located within the Owinza pronghorn migratory corridor and include 12,416 acres (39%) of stopover habitat. Most of the siting corridors under Alternative B where noise and activity would be concentrated appear to provide important wintering habitat for mule deer and pronghorn during severe winters (Edelmann et al. 2022a), and displacement of animals from these areas during winter may have substantial effects to fitness of individuals and the Owinza populations that use these habitats and may be particularly acute during severe winters. Displacement of mule deer and pronghorn due to noise would cease after decommissioning once human noise and activity are reduced.

During operation, as the ground level noise from operational turbines has been modeled at 73.9 dB from the turbine hub and 85.3 dB from the blade (SWCA 2022), there is sufficient evidence to estimate that noise from turbine operations would have an effect on mule deer and pronghorn habitat use directly adjacent to the turbines. In addition, during operation, regular and emergency maintenance and repair activities may require the use of heavy equipment and presence of humans, and noise and visual disturbance would reach the level of that during construction intermittently and at localized work areas during project operations; therefore, the potential for displacement of mule deer and pronghorn would continue at any point during the year during project operations.

Summary: In summary, increased noise and human disturbance during construction and decommissioning as well as the presence of infrastructure during operation would displace mule deer and pronghorn from important winter habitats. Project-related ground disturbance would also further reduce, degrade, and fragment existing winter and stopover habitat for both species in the analysis area. Individuals would likely shift seasonal habitat use to less-disturbed areas in the analysis area or to outside of the analysis area in adjacent winter habitats where other existing populations of mule deer (such as the Bennet and Black Butte Hills) and pronghorn (generally located to the west and east of the analysis area) are present. In both cases, because available winter habitat would be reduced and the density of animals in the remaining areas would increase, competition for critical winter resources (such as forage) would increase for entire populations. This may result in an increase in depredation of agricultural crops near the project. The human and noise disturbance and habitat loss would contribute to increased stress levels for individuals, resulting in reduced fat reserves in winter which would increase the risk for winter mortality, and increase the risk of reduced birth weights of fawns for surviving females.

Since availability of forage is a major population-limiting factor for both mule deer and pronghorn, increased competition in winter habitats would likely increase winter mortality and result in Owinza population-level effects for both species, particularly during severe winters. Since Owinza population-level effects from winter mortality during a single severe winter have been recorded, ongoing displacement for two winters may have compounding effects for both the Owinza and adjacent wintering populations, if the Owinza population is displaced into adjacent winter ranges. Similarly, habitat loss and fragmentation in winter habitat may cause individuals to move into areas with higher human-wildlife conflict, such as agricultural fields or roadways, which may increase risk of direct mortality. In addition, the new roads would contribute to increased disturbance from human noise and activity, increase direct mortality of mule deer and pronghorn collisions with vehicles, and increase access for hunters. The increase in road density would also contribute to existing fragmentation and habitat degradation in the analysis areas. Additional temporary fences during construction in the analysis areas would also increase existing challenges to movement across the analysis areas, including along the identified pronghorn and mule deer Owinza migration routes. Table 3.18-2 summarizes the quantitative impacts to mule deer and pronghorn under each action alternative; additional qualitative discussion is provided in each of the action alternative sections below.

Table 3.18-2. Summary of Impacts to Big Game in Winter and Migratory Habitats

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of ground disturbance	Total: 9,114 acres Work areas: 6,740 acres Infrastructure: 2,374 acres	Total: 6,953 acres Work areas: 5,142 acres Infrastructure: 1,811 acres	Total: 4,838 acres Work areas: 3,714 acres Infrastructure: 1,124 acres	Total: 5,136 acres Work areas: 3,734 acres Infrastructure: 1,402 acres	Total: 4,492 acres Work areas: 3,500 acres Infrastructure: 992 acres
Acres of ground disturbance in mule deer and pronghorn migratory stopover habitat (percentage in analysis area)	Mule deer total: 696 acres Work areas: 515 acres (1.7%) Infrastructure: 181 acres (0.6%) Pronghorn total: 150 acres Work areas: 111 acres (0.3%) Infrastructure: 39 acres (0.1%)	Mule deer total: 222 acres Work areas: 164 acres (0.6%) Infrastructure: 58 acres (0.2%) Pronghorn total: 130 acres Work areas: 96 acres (0.3%) Infrastructure: 34 acres (0.1%)	Mule deer total: 206 acres Work areas: 158 acres (0.5%) Infrastructure: 48 acres (0.2%) Pronghorn total: 120 acres Work areas: 92 acres (0.3%) Infrastructure: 28 acres (0.1%)	Mule deer total: 81 acres Work areas: 59 acres (0.2%) Infrastructure: 22 acres (0.1%) Pronghorn total: 19 acres Work areas: 14 acres (< 0.1%) Infrastructure: 5 acres (< 0.1%)	Mule deer total: 77 acres Work areas: 60 acres (0.2%) Infrastructure: 17 acres (0.1%) Pronghorn total: 0.5 acre Work areas: 0.4 acre (< 0.1%) Infrastructure: 0.1 acre (< 0.1%)
Acres of construction noise disturbance (percentage in analysis area)	Mule deer: Winter: 799,673 acres (31%) Migration: 299,613 acres (37%) Pronghorn: Winter: 564,161 acres (37%) Migration: 107,984 acres (35%)	Mule deer: Winter: 727,423 acres (28%) Migration: 266,885 acres (33%) Pronghorn: Winter: 526,397 acres (35%) Migration: 97,946 acres (32%)	Mule deer: Winter: 585,511 acres (22%) Migration: 258,091 acres (32%) Pronghorn: Winter: 488,089 acres (32%) Migration: 96,038 acres (31%)	Mule deer: Winter: 684,674 acres (26%) Migration: 240,797 acres (30%) Pronghorn: Winter: 526,397 acres (35%) Migration; 97,946 acres (32%)	Mule deer: Winter: 673,188 acres (25%) Migration; 235,983 acres (29%) Pronghorn: Winter: 474,643 acres (31%) Migration: 97,947 acres (32%)
Miles of new roads*	486 miles	360 miles	270 miles	272 miles	231 miles
Miles of improved roads*	147 miles	117 miles	83 miles	101 miles	79 miles
Road density in analysis area (in migration routes)	Mule deer: 1.87 miles/square mile (1.93 migration) Pronghorn: 1.98 miles/square mile (2.12 migration)	Mule deer: 1.84 miles/square mile (1.85 migration) Pronghorn: 1.93 miles/square mile (2.03 migration)	Mule deer: 1.81 miles/square mile (1.80 migration) Pronghorn: 1.89 miles/square mile (2.04 migration)	Mule deer: 1.81 miles/square mile (1.77 migration) Pronghorn: 1.89 miles/square mile (1.91 migration)	Mule deer: 1.80 miles/square mile (1.73 migration) Pronghorn: 1.87 miles/square mile (1.81 migration)
Miles of temporary fencing	395 miles	303 miles	222 miles	257 miles	200 miles

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated construction and decommissioning duration	Up to 2 years construction, up to 2 years decommissioning (Alternative B with Additional Measures would be up to 3 years construction, and up to 3 years decommissioning.)	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning

* Project traffic would also use existing county roads and highways to access the corridors; these mileages are summarized in Table 2.4-2.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected. Under Alternative B with Additional Measures, the construction schedule within the Star Lake grazing allotment would occur in three subphases so that construction occurs in approximately one third of the Star Lake grazing allotment at any given time (see Figure 2.4-3). Primary access roads to an active construction subphase area (for example the West Star Lake subphase) would continue to be used through the previously completed subphase areas (for example the North Star Lake subphase) to allow for sufficient access from ID 24. This construction phasing would extend the construction and decommissioning phases from 2 years (as described under Alternative B) to 3 years.

Additional project-specific mitigation measures for big game habitats and populations are summarized in Table 3.18-3 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.18-3. Mitigation for Big Game Habitats and Populations

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1		
4	E	dd
6	I	ee
17	M	ff
33	P	gg
39	Y	hh
43	–	ii
–	–	jj
–	–	cccc
–	–	dddd
–	–	ffff

Note: All measures are detailed in EIS Appendix 4.

Implementation of these additional measures under Alternative B, in addition to those described for wildlife movement in Section 3.18.1.2.2 in EIS Appendix 15, would reduce but not eliminate the potential for Owinza population-level effects to mule deer and pronghorn during construction and decommissioning by limiting human noise and disturbance during times of critical winter habitat use and during spring migratory movements, as well as implement measures on a case-by-case basis to reduce the potential for road construction to impede big game movement.

Implementation of seasonal restrictions would prohibit construction and decommissioning activities between January 1 and April 15 (measure dd), which would reduce the potential for behavioral alterations and loss of access to resources from noise disturbance and human presence during such time (including much of the winter season and spring migration periods). Seasonal restrictions for greater sage-grouse wintering and nesting (occurring between December 1 and February 29 and March 1 and June 30) would also occur in specific habitat areas, some of which may overlap important winter habitat and migration corridors for mule deer and pronghorn. Since there would be no limitation on activities before and after the seasonal restrictions, and animals are known to be present and/or migrating during the fall and early winter within the siting corridors, the potential for displacement of mule deer and pronghorn would still occur at similar levels to those described for the construction and decommissioning phases for Alternative B without additional measures. Impacts during fall migration and the early winter periods would remain the same as Alternative B without additional measures, which may contribute to reduced landscape permeability for both species and reduce access to winter habitats due to human presence and noise associated with construction activities. Concentrating construction activities within the subphase areas would allow for mule deer and pronghorn to use habitats outside of the subphase area within which construction is occurring in a single year. As a result, human noise and activities would occur for 3 years under this alternative, although activities would occur at a lower intensity (due to less construction personnel present and equipment operating at any one time) and in more localized areas than the other action alternatives. Mule deer and pronghorn populations would experience a lesser degree of disruption and displacement from human noise and activity. During operation, maintenance and repair activities would be avoided, to the extent possible, between November 15 and April 30 during operation (measure dd), which may reduce the potential for behavioral alterations and loss of access to resources from noise disturbance and human presence during such time (including much of the winter season and spring migration periods). Seasonal restrictions for greater sage-grouse wintering and nesting (occurring between December 1 and February 29 and March and June 30) would also occur in specific habitat areas, some of which may overlap important winter habitat and migration corridors for mule deer and pronghorn. Impacts during fall migration and the early winter periods would remain the same as those described for the operation phase under Alternative B without additional measures, which may contribute to reduced landscape permeability for both species and reduce access to winter habitats due to the presence of roads and infrastructure and intermittent maintenance and repair activities.

Alternative B, even with the implementation of additional measures to reduce displacement of mule deer and pronghorn, would still degrade and fragment important winter habitat for both species and contribute to infrastructure avoidance behaviors as the proposed project design would be the same as that under Alternative B. New roads would still contribute to fragmentation of habitats, reduce the permeability of the landscape to movement, and facilitate access of the recreational public (including hunters) into the area, which may result in direct mortality of individuals and displacement and disturbance.

3.18.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B, though the magnitude of effects would likely be somewhat reduced. The construction and decommissioning schedule under this alternative would occur in two subphases across 3 years for construction and 3 years for decommissioning within the Star Lake grazing allotment, so that construction occurs in approximately half of the Star Lake grazing allotment at any given time (see Figure 2.4-3). For areas outside of the two subphase areas within the Star Lake grazing allotment, construction activities could occur at any time during the up-to-3-year construction and decommissioning phases. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures. Alternative C would reduce or eliminate several of the westernmost siting corridors located in winter habitat for both species, though noise disturbance during construction would only be somewhat reduced when compared to Alternative B (see Table 3.18-2). Siting corridors would still be present across the identified pronghorn and mule deer Owinza migration routes (disturbing approximately 96 acres of pronghorn and 164 acres of mule deer stopover habitat due to work areas and 34 acres of pronghorn and 58 acres of mule deer stopover habitat due to project infrastructure) and would contribute to movement barriers for pronghorn and mule deer between winter and summer ranges and may contribute to Owinza population-scale migratory behavior loss if avoidance behavior continues through operation (i.e., long-term avoidance that could lead to forgetting the original migration route). However, habitats would be available directly west of the migration route between the Alternative C siting corridors and existing agricultural lands (which would be occupied by siting corridors under Alternative B) that may retain existing unmapped north-south movement areas or allow for a shift in use west of the identified migration route. This alternative would reduce new temporary fencing by 92 miles when compared to Alternative B (see Table 3.18-2), which would reduce movement barriers associated with the project for both species. Traffic volume would be slightly greater than Alternative B but slightly less than Alternative B with Additional Measures (see Tables 2.4-1 and 2.4-3); however, total miles of new access roads would be reduced by 126 miles (see Table 3.18-2). Similar to Alternative B, road density in mule deer and pronghorn habitats would nearly meet (in mule deer and pronghorn winter habitat and mule deer migratory routes) or exceed (in pronghorn migratory routes) the 2-mile-per-square-mile threshold for many terrestrial wildlife species.

MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would prohibit construction and decommissioning activities between January 1 and April 15, avoid maintenance and repair activities between November 15 and April 30, and reduce vehicle traffic on project access roads (see EIS Appendix 4). These measures would further reduce but not eliminate the potential for mid- to late-winter and spring migratory displacement effects and potential for vehicle strikes to mule deer and pronghorn. The reduction in seasonal noise and vegetation disturbance in winter habitats, when combined with the implementation of applicant-committed measures and other mitigation, would result in a reduced impact to wintering Owinza mule deer and pronghorn populations and spring migratory behaviors under Alternative C when compared to Alternative B.

3.18.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative C, though the magnitude of effects would be reduced further but not eliminated due to the greater reduction in ground and noise disturbance to winter habitat. The construction and decommissioning schedule under this alternative would occur in two subphases across 3 years for construction and 3 years for decommissioning within the Star Lake grazing allotment, so that construction occurs in approximately one third of the Star Lake grazing allotment at any given time (see Figure 2.4-3). For areas outside of the two subphase areas within the Star Lake grazing allotment, construction activities could occur at any time during the 3-year construction phase and the 3-year decommissioning phase; however, most of the siting corridors would be located within the two subphase areas, areas within which construction activities that may occur at any time during the year would be limited. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures. Effects to the Owinza pronghorn migration route would be similar to Alternative C (92 acres of work areas and 28 acres of infrastructure). Noise and displacement effects would be greatly reduced when compared to Alternative B (see Table 3.18-2). Alternative D would not only eliminate the same siting corridors as Alternative C, but it would also remove the siting corridors east of Crestview Road to reduce impacts in areas with high sagebrush cover that provide important winter and summer habitat for pronghorn and mule deer. Alternative D would have a reduced amount of temporary fencing when compared to Alternatives B, C, and E (see Table 3.18-2), which would reduce movement barriers associated with the project for both species. Alternative D would result in reduced noise and vegetation disturbance and road construction in winter habitat when compared to Alternative B, C, and E (see Table 3.18-2). Alternative D would also have lower traffic volume than Alternatives B and C and the second-lowest miles of new access roads among the action alternatives (see Tables 2.4-1 and 2.4-3). Similar to Alternative C, road density in mule deer and pronghorn habitats would nearly meet (in mule deer and pronghorn winter habitat and mule deer migratory routes) or exceed (in pronghorn migratory routes) the 2-mile-per-square-mile threshold for many terrestrial wildlife species.

MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would prohibit construction and decommissioning activities between January 1 and April 15, avoid maintenance and repair activities between November 15 and April 30, and reduce vehicle traffic on project access roads (see EIS Appendix 4). This would further reduce but not eliminate the potential for mid- to late-winter and spring migratory displacement and vehicle strikes to mule deer and pronghorn. The additional reduction in seasonal noise and vegetation disturbance of winter habitat when combined with the implementation of applicant-committed measures and other mitigation would result in a reduced impact to wintering Owinza mule deer and pronghorn populations and spring migratory behaviors under Alternative D when compared to Alternatives B and C.

3.18.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects on wintering pronghorn and mule deer under Alternative E would be similar to Alternative C, though the magnitude of effects would be reduced commensurately with the reduction in habitat and noise disturbance to winter habitats in the southern portion of the analysis area (see Table 3.18-2). The construction and decommissioning schedule under this alternative would occur in one subphase across 3 years for construction and 3 years for decommissioning within the Star Lake grazing allotment, so that construction occurs in approximately half of the Star Lake grazing allotment at any given time (see Figure 2.4-3). For areas outside of the subphase area within the Star Lake grazing allotment, construction activities could occur at any time during the up-to-3-year construction and decommissioning phases. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures. Effects to the Owinza pronghorn and mule deer migration routes would be reduced similar to Alternative C, but disturbance in pronghorn stopover habitat would be reduced to 14 acres of work areas and 5 acres of infrastructure, and disturbance in mule deer stopover habitat would be reduced to 59 acres of work areas and 22 acres of infrastructure. Effects on wintering mule deer would be slightly reduced when compared to Alternative C. Effects to both species would be greatly reduced when compared to Alternative B. Alternative E would not only eliminate the same siting corridors as Alternative C, but it would also reduce most of the siting corridors west of Crestview Road and south of WEC. Alternative E would also require 46 miles less temporary fencing than Alternative C (see Table 3.18-2), which would reduce movement barriers associated with the project for both species. Alternative E would result in less noise and vegetation and road construction in mule deer winter habitat than Alternatives B and C, but only slightly more than Alternative D (see Table 3.18-2). Alternative E would have less miles of new access roads and a lower traffic volume than Alternatives B and C but more miles of new access roads and a higher traffic volume than Alternative D and the Preferred Alternative (see Tables 2.4-1 and 2.4-3). Road density in mule deer and pronghorn habitats would nearly meet but would not exceed the 2-mile-per-square-mile threshold for many terrestrial wildlife species.

MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would prohibit construction and decommissioning activities between January 1 and April 15, avoid maintenance and repair activities between November 15 and April 30, and reduce vehicle traffic on project access roads (see EIS Appendix 4). These measures would further reduce but not eliminate the potential mid- to late-winter and spring migratory displacement effects and potential for vehicle strikes to mule deer and pronghorn. The additional reduction in seasonal noise and vegetation disturbance in pronghorn winter habitat when combined with the implementation of applicant-committed measures and other mitigation would result in the most greatly reduced impacts of the action alternatives to wintering Owinza pronghorn populations. Impact to wintering Owinza mule deer and pronghorn populations would be reduced under Alternative E when compared to Alternatives B and C, but would be slightly more than Alternative D.

3.18.2.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to Alternative D, though the magnitude of effects would be reduced commensurately with to the greater reduction in ground and noise disturbance to winter habitat (see Table 3.18-2). The construction and decommissioning schedule under this alternative would focus major construction activities within a single region of the project area at a time, with three subphases across 3 years for construction and 3 years for decommissioning. Construction and decommissioning activities would be divided into three subphase areas (see Figure 2.4-4), and it is anticipated that construction year 1 would occur in the North Star Lake subphase area, construction year 2 would be in the Sid Butte subphase area, and construction year 3 would be in the South Star Lake subphase area. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures. Effects to the Owinza pronghorn migration route and stopover habitats, in particular, would be greatly reduced compared to the other action alternatives as a result of the reduced siting corridors within these areas (less than 1 acre of disturbance due to work areas and infrastructure). Effects to the Owinza mule deer migration route and stopover habitat would be the same as Alternative E. Noise and displacement effects would be reduced when compared to Alternative D for mule deer and Alternative E for pronghorn winter habitat (effects to migration habitat would be similar) (see Table 3.18-2). The Preferred Alternative would result in the smallest footprint of siting corridors of all action alternatives, particularly in those that would be located within migratory routes and winter habitats for both species; however, it would not eliminate disturbance within migratory corridors. The Preferred Alternative would also have the least amount of temporary fencing of the action alternatives (see Table 3.18-2), which would reduce movement barriers associated with the project for both species. The Preferred Alternative would result in the least noise and vegetation disturbance and road construction in winter habitat of the action alternatives (see Table 3.18-2). The Preferred Alternative would also have the second-lowest traffic volume and the least miles of new access roads (see Tables 2.4-1 and 2.4-3). Road density in mule deer and pronghorn habitats would nearly meet but would not exceed the 2-mile-per-square-mile threshold for many terrestrial wildlife species.

MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would prohibit construction and decommissioning activities between January 1 and April 15, avoid maintenance and repair activities between November 15 and April 30, and reduce vehicle traffic on project access roads (see EIS Appendix 4). This would further reduce but not eliminate the potential for mid- to late-winter and spring migratory displacement and vehicle strikes to mule deer and pronghorn. The additional reduction in seasonal noise and vegetation disturbance of winter habitat when combined with the implementation of applicant-committed measures and other mitigation would result in a reduced impact to wintering Owinza mule deer and pronghorn populations under the Preferred Alternative when compared to Alternatives B, C, D, and E.

3.18.2.2.7 CUMULATIVE IMPACTS

As described in Section 3.18.2.1 (Affected Environment), approximately 28% of habitat for mule deer and approximately 26% of habitat for pronghorn in the analysis area has been altered due to agriculture, nonnative plants, roads, development, or are planned energy development projects. Ongoing and future efforts related to SO3362 and the Idaho Action Plan (IDFG 2022c) within the Smoky-Boise Complex and the Big Desert-Mountain Valley Complex Priority Areas may contribute to preservation or existing or restoration of big game winter and migratory habitats across the region. However, current projects are located outside of the analysis areas and would be unlikely to contribute to cumulative effects within the analysis areas.

As a result of the current conditions of the landscape, existing big game habitat may not support the same density of individuals as unaltered landscapes and existing unfragmented or altered habitats are likely important resources for populations in the analysis area. Development of planned energy projects would result in alteration of available habitat beyond that associated with the proposed project footprints, and big game species avoidance behavior of areas of new development would further reduce remaining habitat availability in the analysis area and may result in an increase in depredation of agricultural crops near the project. The effects of habitat loss, disturbance from human presence and activity, noise, and movement barriers would be greatest for wintering and migrating Owinza populations of both species as development in the analysis area would be concentrated in the area south of ID 24 in an area that provides important winter habitat and resources during severe winters. The project's new access roads, increased traffic, and fencing in combination with those of other future projects would also further reduce the permeability of the landscape for big game species. The analysis assumes that because future projects would be on BLM public land, they would require wildlife friendly fences. The effects on pronghorn would likely be greater than those on mule deer, due to the more limited winter habitat availability, current condition of habitat in the analysis area, and increased challenge navigating fencing and other barriers. Since the planned energy development projects would occur outside of the mapped Owinza pronghorn migration route, effects to this route would be limited to project-specific effects described for each alternative.

When combined with the planned energy development projects, Alternative B would contribute to fragmentation of most of the remaining undisturbed winter habitat for mule deer (see Figure 3.18-3) and pronghorn (see Figure 3.18-4) in the analysis area south of ID 24, and avoidance behavior would magnify habitat loss and fragmentation effects beyond the footprint of the projects. If one or more planned energy project's construction phases were to occur at the same time as that for the project, displacement and disturbance effects for big game would be magnified and would result in significantly increased movement barriers and loss of access to important winter resources for the Owinza populations of mule deer and pronghorn. Additionally, avoidance of infrastructure and potential for intermittent human presence and noise from maintenance and repair activities during the operation phase would continue to contribute to potential avoidance behavior, which may result in long-term loss of important winter resources. Alternative B would contribute cumulatively with ongoing and future projects to increased likelihood of winter mortality and barriers to migration routes for both species, which is anticipated to be greatest during harsh winters, and may result in Owinza population-level effects for both species if disturbance and avoidance keeps individuals from accessing important resources. The seasonal restrictions during the construction and decommissioning phases and recommendations during operations under Alternative B with Additional Measures may contribute to reducing the cumulative contribution of the project in mid- to late winter.

Alternative C, when combined with the planned energy development projects, would reduce the magnitude of fragmentation and avoidance effects by avoiding development, constructing new access roads, and installing new fencing on a larger portion of relatively intact winter habitat south of ID 24 for both species, when compared to Alternative B. Similar to Alternative B, should one or more planned energy project's construction phase occur at the same time as that for the project, effects would be similar, along with the effects described for operations. The existing winter habitat that would not be developed may somewhat reduce risk of increased winter mortality for both species by retaining a portion of important resources in the region for Owinza wintering populations. However, as Alternative C and the planned energy development projects would still alter habitat and increase noise and human activity over a large proportion of existing winter habitat, Owinza population-level effects may occur from the resulting avoidance of these areas and a reduced availability of resources, particularly during harsh winters.

When combined with the planned energy development projects, Alternative D would further reduce fragmentation and avoidance effects by reducing the overall project footprint in areas of relatively intact winter habitat for mule deer and pronghorn when compared to Alternatives B and C. Similar to Alternatives B and C, should one or more planned energy project's construction phase occur at the same time as that for the project, effects would be similar, along with the effects described for operations. Also similar to Alternative C, existing winter habitat that would not be developed may reduce risk of increased winter mortality for both species by retaining a portion of important resources in the region for Owinza wintering populations. However, because Alternative D and the planned energy development projects would still alter habitat and increase noise and human activity over a large proportion of existing winter habitat, Owinza population-level effects may occur from the resulting avoidance of these areas and a reduced availability of resources, particularly during harsh winters. Since a greater proportion of existing winter habitat would be avoided under Alternative D than Alternative C, these effects may be somewhat reduced but not eliminated.

Alternative E, when combined with the planned energy development projects, would reduce the magnitude of fragmentation and avoidance effects by reducing the overall project footprint in areas of relatively intact winter habitat south of ID 24 for both species, when compared to Alternative B and C. Similar to Alternatives B, C and D, should one or more planned energy project's construction phase occur at the same time as that for the project, effects would be similar, along with the effects described for operations. Also similar to Alternatives C and D, existing winter habitat that would not be developed may reduce risk of increased winter mortality for both species by retaining a portion of important resources in the region for Owinza wintering populations. However, because Alternative E and the planned energy development projects would still cumulatively alter habitat and increase noise and human activity over a large proportion of existing winter habitat, Owinza population-level effects may occur from the resulting avoidance of these areas and a reduced availability of resources, particularly during harsh winters. Since a greater proportion of existing winter habitat, particularly areas in the southern portion of the analysis area, would be avoided under Alternative E than Alternative B and C, these effects may be reduced. Though the location of disturbance and avoidance would be shifted, overall effects of Alternative E would be similar to Alternative D.

The Preferred Alternative, when combined with the planned energy development projects, would have similar cumulative effects as Alternative E; however, because the Preferred Alternative would result in the smallest overall project footprint of all action alternatives and would result in the least disturbance within migratory corridors, the magnitude of fragmentation and avoidance effects would be commensurately reduced. However, similar to Alternatives B, C, D, and E, should one or more planned energy project's construction phase occur at the same time as that for the project, effects would be similar, along with the effects described for operations. Additionally, the potential for displacement and disturbance during the construction phase would occur over a longer time than the other action alternative. Since the Preferred Alternative and the planned energy development projects would still cumulatively alter habitat and increase noise and human activity over a large proportion of existing winter habitat, Owinza population-level effects may occur from the resulting avoidance of these areas and a reduced availability of resources, particularly during harsh winters. Since a greater proportion of existing winter habitat, particularly areas in the southern portion of the analysis area, would be avoided under the Preferred Alternative than under Alternatives B, C, and D, these effects may be reduced from those action alternatives. The Preferred Alternative would result in slightly greater disturbance in the southern portion of the analysis area than Alternative E; however, the reduction in disturbance within migratory corridors would be less than Alternative E and may result in less disturbance to these areas.

3.18.2.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would have irreversible impacts on mule deer and pronghorn from human activities (e.g., vehicle use, construction equipment, maintenance activities), wind turbine operation (e.g., noise), and ground disturbance that would remove or alter habitat. The project would degrade and fragment important winter habitat for mule deer and pronghorn and contribute to avoidance behavior. New roads would also contribute to fragmentation of habitats, reduce the permeability of the landscape to movement, and facilitate access of the recreational public (including hunters) into the area, which may result in direct mortality of individuals and displacement and disturbance beyond that from the presence of infrastructure. Habitat alteration and loss effects would last up to 84 to 86 years, which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 50 years for vegetation to reestablish after final reclamation. Population-level effects from disturbance and displacement of big game habitats and direct mortality of individuals would be an irreversible effect, particularly if avoidance behavior continues for the life of the project and local populations cease use of mapped migration routes, stopover habitats, and winter range. Should habitat restoration activities be successful, migratory behaviors of big game species continue through the life of the project, and habitat use of the disturbed areas return following decommissioning and restoration, these effects would be irretrievable rather than irreversible.

Of the action alternatives, Alternative B would result in the greatest potential for long-term effects on Owinza mule deer and pronghorn populations due to the size and location of the siting corridors and potential for construction, decommissioning, and maintenance and repair activities to occur at any point in the year within each subphase, including during migration and wintering periods. Alternative B with Additional Measures would reduce but not eliminate effects on migratory movement and access to winter habitat during mid- to late winter and spring during the construction phases, though effects during operations would remain similar.

Alternative C would somewhat reduce the potential for long-term effects on Owinza mule deer and pronghorn populations when compared to Alternative B with Additional Measures due to the reduced size and location of the siting corridors and implementation of the same seasonal restrictions. Alternative D would also somewhat reduce but not eliminate the potential for long-term effects on Owinza mule deer and pronghorn populations from those under Alternative C due to further reductions in the size and change in location of the siting corridors. Alternative E would have similar effects to those under Alternative D. Of the action alternatives, the Preferred Alternative would result in the least potential disturbance to important winter habitat and migratory routes due to the reduced size and location of the siting corridors, though the additional year of construction would increase the potential for extended disturbance and displacement effects associated with construction activities; however, all action alternatives would result in some degree of irreversible or irretrievable effects.

3.18.2.4 Compensatory Mitigation

Even with the implementation of applicant-committed measures and other mitigation (see EIS Appendix 4) described above for mule deer and pronghorn, loss of habitat acres and some level of disturbance associated with direct and indirect effects from the project construction activities would still occur. Therefore, compensatory mitigation is warranted to address these residual impacts.

The big game mitigation plan would involve adaptive management that is informed by seasonal surveys during the project phases. In addition, the quantity of required compensatory mitigation for big game winter range and migration habitat (i.e., routes and stopover areas) would be estimated as the direct acreage of loss from the project infrastructure and facilities. Although literature on the indirect effects of wind energy–related construction disturbance on big game is limited, studies on similar disturbance associated with oil and gas field development were reviewed. Therefore, the acreage of residual effects leading to the reduction of habitat quality and warranting compensatory mitigation would be estimated using a spatial buffer of 0.5 mile (Sawyer et al. 2017; Sawyer et al. 2019) around the project disturbance. MVE would be required to fund and implement compensatory mitigation that would prioritize long-term collaborative habitat protection and habitat restoration commensurate with the estimated quantity of project-caused direct and indirect loss and degradation of big game habitat based on the BLM's selected action alternative. Mitigation actions would be prioritized based on providing benefits to big game within winter range, migration routes, and stopover habitat. Additionally, selected projects must establish measurable goals and objectives and include appropriate monitoring and reporting to ensure the BLM's goals and objectives have been met. Please refer to Measure I in Table App4-5 and the Mitigation Framework for Big Game section in EIS Appendix 4 for more information.

The TAC would include resource specialists from the BLM, OSC, USFWS, and IDFG and would aid in the implementation and oversight of a comprehensive big game mitigation plan throughout all phases of the project. This plan would include adaptive management details and would inform the compensatory mitigation mechanisms to offset adverse project effects to big game.

Additionally, as described in EIS Appendix 4 in the Mitigation Variance Process section, the TAC would engage with the compliance inspection contractor, MVE'S compliance manager, and the environmental monitors contracted by MVE, as needed, to evaluate variances to the project's construction and operation plans and mitigation measures. The TAC would then advise the BLM Authorized Officer based on their expertise and available information. The TAC would provide advice to the BLM Authorized Officer on revoking an approved variance and restoring the spatial and seasonal extent of the mitigation measures outlined in EIS Appendix 4 in the event that resource conditions change, on additional resource protections are needed as determined by a qualified biologist, or in response to a violation of the terms and conditions of the wildlife variance request.

3.18.3 Amphibians

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.18.4 Pygmy Rabbit

Please see EIS Appendix 15 (Issues Analyzed in Detail and Determined to Not Have Significant Impacts) for a discussion of the affected environment and potential impacts to this resource from implementation of Alternatives A through E and the Preferred Alternative.

3.19 MINIDOKA NATIONAL HISTORIC SITE INTERPRETIVE PURPOSE

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.19-1.

Table 3.19-1. Analysis Approach for Minidoka National Historic Site Interpretive Purpose

Issue Analyzed in Detail	How would the impacts identified within the EIS affect the NPS interpretive purpose of Minidoka NHS? Other sections of the EIS, including Sections 3.5 (Cultural Resources), 3.6.1 (Environmental Justice Communities), and 3.16 (Visual Resources), provide detailed assessments of potential impacts to cultural resources, environmental justice communities, and visual resources, including impacts at Minidoka NHS. This section provides a qualitative assessment of impacts to the Minidoka NHS interpretive purpose through the lens of visitor experience.
Analysis Area	The analysis area for this issue is the 388-acre Idaho unit of the NPS-managed Minidoka NHS, as described briefly in Section 3.19.1 and in more detail in EIS Appendix 9; see also Figure 3.19-1 (NPS 2023:Figure 0.1).
Indicators	Qualitative assessment of impacts to the Minidoka NHS interpretive purpose through the lens of visitor experience using a summary of impacts evaluated throughout the EIS, and specifically, impacts to visitor experience of these interpretive themes: • The story of the relocation: The incarcerees' story of relocation is conveyed when visitors view the current setting (especially when compared to the lush green coastal areas from which the incarcerees were unconstitutionally extracted; see also Section 3.20.3.3.1 in EIS Appendix 9), feel the sense of isolation described by those brought to Minidoka, and discover the line from freedom to confinement while entering the historic entrance (Figure 3.19-2). • Living conditions: Incarceree living conditions are conveyed when visitors • view the current setting and specifically how it looked historically through camp construction (Figure 3.19-3) and deconstruction and how it looked immediately following WWII when homesteaded by WWII veterans (excluding Japanese American veterans[41]); • feel the sense of isolation described by those incarcerated at Minidoka; • understand the extent of Minidoka's WWII farm operations; • learn about what daily life was like for the inhabitants of Minidoka[42] (Figures 3.19-4, 3.19-5, and 3.19-7) and the surrounding communities they helped or who helped those incarcerated during WWII; • see original and restored camp structures on-site (Figure 3.19-9); and • walk along historic camp pathways in the preserved cultural landscape. • The work performed: The work performed by incarcerees is conveyed when visitors • view the existing setting, specifically how it looked immediately following WWII when homesteaded by WWII veterans (excluding Japanese American veterans[43]); • understand the extent of Minidoka's WWII farm operations; • learn about what daily life was like for the inhabitants of Minidoka WRC and the surrounding communities they helped; and • walk along the reconstructed perimeter fence and learn of the incarcerees' experience having to exit and reenter the incarceration site each day as they went to perform agricultural work. • Contributions to the military: Incarceree contributions to the military are conveyed when visitors discover the line from freedom to confinement while entering the historic entrance, see original camp structures where individuals lived before serving in the military and where soldiers' families remained incarcerated, and contemplate and reflect at the Honor Roll (Figure 3.19-7).

[41] As noted on Figure 3.19-3, after WWII ended, Minidoka WRC and its agricultural lands were converted to homesteads and were offered to returning war veterans, excluding Japanese American veterans.

[42] The interpretive sign in Figure 3.19-4 is part of the Minidoka NHS trail near the North Side Canal. Incarcerees found peace spending time near the canal listening to the water and watching birds or fishing. As described on the sign, during the WWII incarceration at Minidoka WRC, incarcerees laboring in adjacent agricultural lands had to walk longer distances to exit the Minidoka WRC to access fields and the contractor that built the fence inhumanely electrified the fence without administrators knowing. Although the fence electricity was shut off, armed guards patrolled the Minidoka WRC perimeter and incarcerees understandably resented their unconstitutional incarceration.

[43] As noted on Figure 3.19-3, after WWII ended, Minidoka WRC and its agricultural lands were converted to homesteads and were offered to returning war veterans, excluding Japanese American veterans.

Impacts Duration	The life of the project (the time encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	The NPS implements their legislative mandate for Minidoka NHS through the statutorily required *Minidoka Internment National Monument General Management Plan* (NPS 2006) and other documents. NPS (2013), *Foundation Document, Minidoka National Historic Site, Idaho and Washington* (NPS 2016), and *Cultural Landscape Report, Minidoka National Historic Site* (NPS 2023) in addition to NPS (2006) define how the NPS will implement the interpretive purpose of Minidoka NHS.
Assumptions or Approach	This qualitative assessment is informed by an integrative evaluation of impacts to the Minidoka NHS interpretive purpose using information and analyses from Sections 3.5 (Cultural Resources), 3.6.1 (Environmental Justice Communities), and 3.16 (Visual Resources) of this EIS and assesses impacts to the Minidoka NHS interpretive purpose through the lens of visitor experience. See also EIS Appendix 9.

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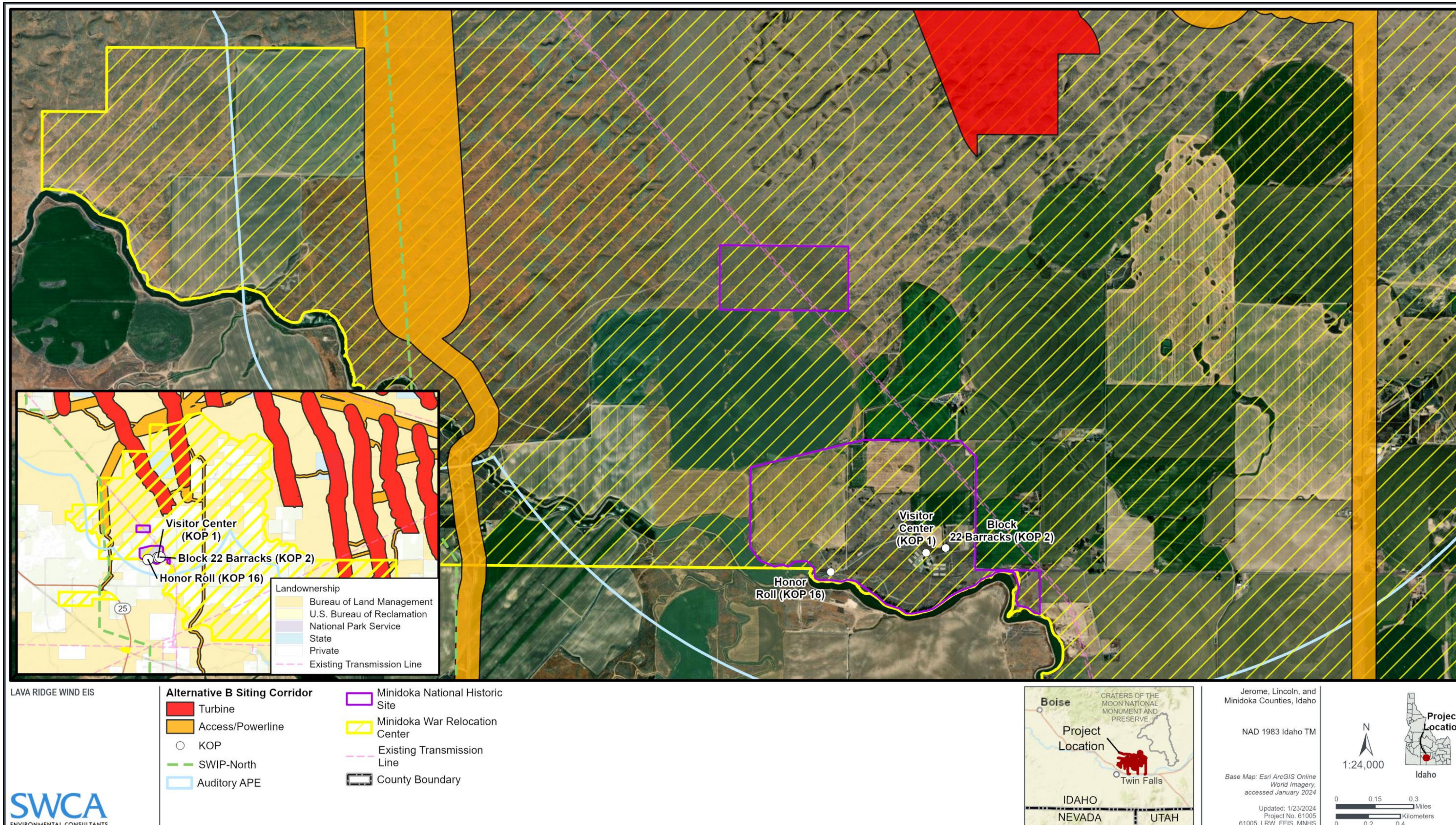

Figure 3.19-1. Minidoka National Historic Site and key observation points (see also Figure 3.5-2 for [non-physical] visual and auditory areas of potential effect).

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3.19.1 Affected Environment[44]

Minidoka NHS is a 388-acre portion of the original Minidoka WRC which was a 34,000-acre WWII–era Japanese American incarceration site, known locally as Hunt Camp. The 388-acre portion of this original incarceration site is the Minidoka NHS Idaho unit. The analysis area for this issue is the 388-acre Idaho unit of the NPS-managed Minidoka NHS, as described in Section 3.5.2 (Minidoka War Relocation Center and Minidoka National Historic Site); see also Figure 3.19-1 (NPS 2023:Figure 0.1). Additionally, Appendix H of the Minidoka National Historic Site Long-Range Interpretive Plan (NPS 2013) shows an Idaho unit map. The NPS interpretive purpose of Minidoka NHS is listed in Public Law. Public Law 110-229, Section 313, instructs the Secretary of the Interior to interpret the following:

- the story of the relocation of Japanese Americans during World War II to the Minidoka Relocation Center and other [incarceration sites] across the United States;
- the living conditions of the [incarceration sites];
- the work performed by the [incarcerees] at the [incarceration sites]; and
- the contributions to the United States military made by Japanese Americans who had been [incarcerated].

As described in BLM (2022a), geographically dispersed environmental justice populations who do not reside in the analysis area can still be affected by actions on BLM public land if those populations use or depend on resources in the analysis area. Dispersed environmental justice populations were therefore considered in the Section 3.6.1 (Environmental Justice Communities) analyses.

All turbine siting corridors are outside of the Minidoka NHS for all alternatives in this analysis. At Minidoka NHS, the cultural landscape, viewshed, and soundscape are fundamental resources associated with the incarceration period (1942–1945); fundamental resources and values are essential to the NPS's achievement of the existing park's purpose and in maintaining the park's significance (NPS 2023).

The NPS has identified the following as areas of fundamental resources and values for Minidoka NHS: historic structures, cultural landscapes, and archeological resource; environmental setting; museum collections; cultural traditions; commemoration and healing; public understanding, education, and involvement (NPS 2016). The visual landscape and soundscape surrounding Minidoka NHS contribute to aspects of these fundamental resources and values but because these resources are located outside of the park unit, there are aspects of these that are not managed by the NPS. Specifically, elements of the environmental setting; commemoration and healing; and public understanding, education, and involvement rely on the rural setting located beyond today's park unit boundaries. For additional information about the fundamental resources and values of Minidoka NHS, see EIS Appendix 9 (NPS 2006, 2016).

Within Minidoka NHS, the Visitor Center (KOP 1), restored Block 22 Barracks (KOP 2), and Honor Roll (KOP 16) are areas often viewed by visitors, including survivors, descendants of survivors, and members of the general public. In these and other locations open to the public, the remote agricultural setting can be viewed. Additionally, in the nighttime, according to NPS (2006:186–187), although located in a relatively sparsely populated area where the night sky can be viewed, various existing sources of artificial light impact Minidoka NHS night skies. Because of its agricultural setting, Minidoka NHS exhibits *natural quiet*, referring to having only natural sources of sound for short periods of time; although it is frequently subject to human-caused background noise, including from traffic on Hunt Road, farm machinery

[44] Please see EIS Appendix 9 (Additional Background Information) for a broader discussion of this resource's affected environment.

operating in adjacent fields, and overflights by aircraft (NPS 2006:186). The acoustic environment is an important component of the natural and cultural resources at Minidoka NHS and has its own intrinsic value (NPS 2015).

3.19.1.1 Existing and Future Trends and Actions

Existing and future trends and actions have impacted and continue to impact the NPS's ability to manage the Minidoka NHS Idaho unit for its interpretive purpose. The trends and actions bring additional human influence into the cultural landscape and viewshed and add noise to the soundscape which are fundamental resources to the Minidoka NHS interpretive purpose and visitor experience. Existing and future trends and actions producing these impacts include adjacent motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, ESR and vegetation treatment projects, and existing ROW projects.

As described in Section 3.1.1 (Existing and Future Trends and Actions), future development in the (non-physical) visual APE beyond the area of the immediate project is likely to include construction of the SWIP-North 500-kV transmission line and construction of the Gateway West high-voltage transmission line. The 1,500-MW Taurus Wind Project is proposed on land west of the siting corridors and is situated within the visual APE, south-southwest of the town of Shoshone. Future transmission line structures and turbine towers planned in the visual APE would result in the development of up to approximately 1,500 MW of wind energy generation in 58,703 acres of the Taurus Wind Project boundary, 1,500 MW of solar energy generation, 37 added miles of transmission structures spaced intermittently along the SWIP-North transmission line, and 53 added miles along the Gateway West transmission line (see Figures 3.1-1 and 3.5-2).

According to NPS (2006:111), many public comments indicated a desire "to see the rural character and prominent landscape features of the surrounding landscape protected, particularly within [Minidoka NHS] limits" and that protection on private lands could be "encouraged through cooperative agreements, such as conservation easements, conservation plans, and scenic conservation easements." However, additional public comments indicated "some [private landowners] were opposed and/or not willing to enter into these types of agreements with the NPS" (NPS 2006:111).

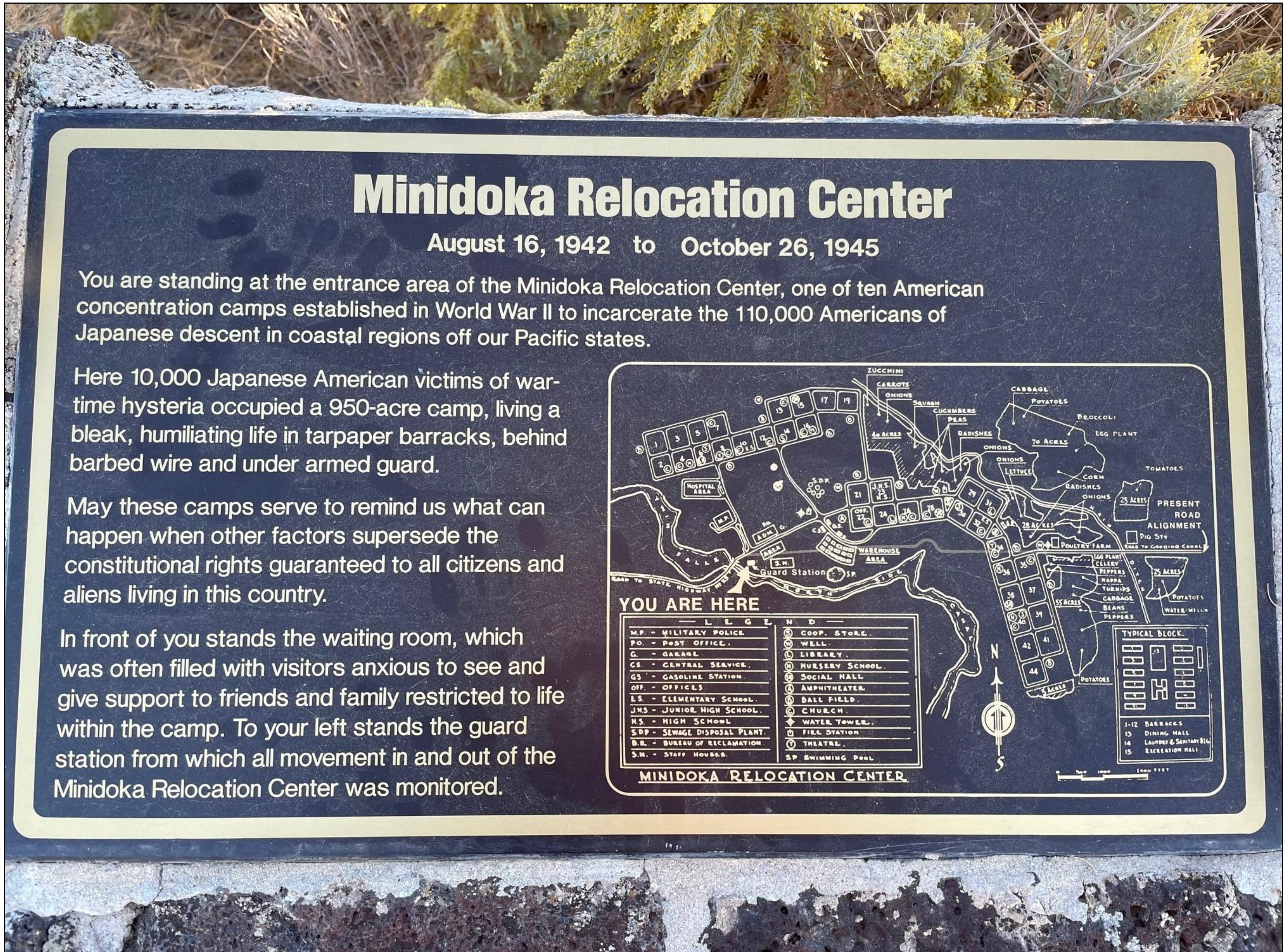

Figure 3.19-2. Minidoka National Historic Site entrance sign near the historic guard tower.

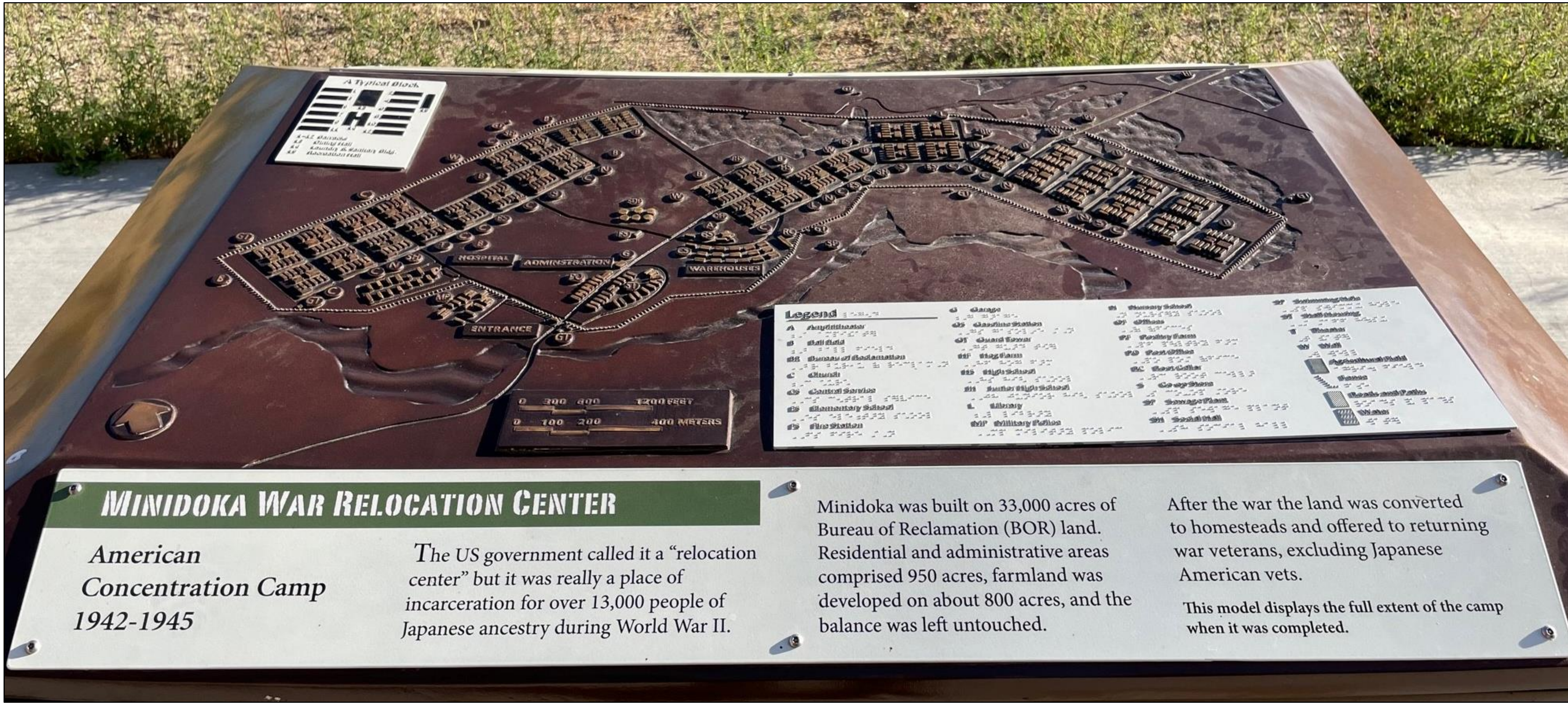

Figure 3.19-3. Minidoka War Relocation Center: layout of the incarceration site.

Figure 3.19-4. Minidoka National Historic Site reconstructed perimeter fence.

Figure 3.19-5. Visual resources KOP 1 (Baseball Field at the Minidoka NHS Visitor Center): existing viewing condition.

Figure 3.19-6. Visual resources KOP 1 (Baseball Field at the Minidoka NHS Visitor Center): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

Figure 3.19-7. Visual resources KOP 16 (Honor Roll at the Minidoka NHS): existing viewing condition.

Figure 3.19-8. Visual resources KOP 16 (Honor Roll at the Minidoka NHS): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

Figure 3.19-9. Visual resources KOP 2 (restored Block 22 Barracks at the Minidoka NHS): existing viewing condition.

Figure 3.19-10. Visual resources KOP 2 (restored Block 22 Barracks at the Minidoka NHS): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

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3.19.2 Impacts

All action alternatives would add impacts from wind turbines to the daytime and nighttime viewshed and, depending on the alternative potentially to the soundscape, of Minidoka NHS. EIS Sections 3.5 (Cultural Resources), 3.6.1 (Environmental Justice Communities), and 3.16 (Visual Resources) provide detailed assessments of impacts including at Minidoka NHS and the former Minidoka WRC resulting in impacts to the Minidoka NHS Idaho unit's interpretive purpose by affecting the experience of visitors at this NHS. The interpretive themes and visitor experience within Minidoka NHS, including at these locations, could be diminished by visual and auditory impacts from the introduction of project components, specifically wind turbines, in the surrounding landscape.

Visual impacts would include the daytime visibility of vertical project structures and the nighttime visibility of aviation warning lights on turbines when the ADLS is activated.[45] Audibility impacts could include the turbine operation noise disrupting the otherwise open rangeland baseline condition.[46] Although project operational noise levels are all below the EPA's recommended noise standard of 55 dBA for residential land uses, the increased noise levels above existing conditions could be perceptible from portions of Minidoka NHS within 2.2 miles of turbines and could impact the visitor experience of remoteness, isolation, abandonment, reflection, and healing.[47]

Within Minidoka NHS, the Visitor Center (KOP 1), restored Block 22 Barracks (KOP 2; Figures 3.19-9 and 3.19-10), and Honor Roll (KOP 16; Figures 3.19-7 and 3.19-8) are areas most often viewed by visitors, including survivors, descendants of survivors of unjust forced incarceration, and members of the general public. The remote agricultural setting can be viewed from multiple locations open to the public within Minidoka NHS. Project components could impact the NPS's ability to implement its interpretive and commemorative purposes at Minidoka NHS. Impacts to the Minidoka NHS interpretive story of relocation, living conditions, work performed, and contribution to the military within this analysis area are qualitatively assessed from the results for the Minidoka NHS KOPs and overall landscape visual change from project components as perceived from Minidoka NHS.

The NPS expressed concern that the impacts on dark skies above the park and direct line of sight to lights on the horizon could significantly alter visitors' experience and capacity to view the nightscapes formerly experienced by incarcerated Japanese Americans at Minidoka WRC (NPS 2021). Anticipated change in night sky brightness is addressed in Section 3.16.2.2.

Concerns have been expressed regarding the visual and emotional impacts the appearance of the project on the landscape could have on the Japanese American and Minidoka-connected communities' experience of Minidoka NHS as a sacred place of healing and learning. The viewshed, noise, and light pollution associated with the proposed project were common concerns identified during interviews (BLM 2022). During conversations "it became clear it was not just the visual disruption, it was also the sense of place and remembrance that resonates with visitors to the NHS" and that the characteristics of the "vast open landscape and isolation all add to the educational and emotional narratives" (BLM 2022). One recommendation to improve engagement with the Japanese American communities with connection to the NHS was that "validating these characteristics and the role they play in Minidoka as a sacred place of

[45] Daytime visual impacts are described in detail in Section 3.16.1.2 (see specifically the experience of landscape character and the potential for scenic quality change for visitors at Minidoka NHS key observation points). Nighttime visual impacts are described in detail in Section 3.16.2.2 (see specifically the descriptions of changes to night sky conditions from potential added horizon brightness from the project).

[46] The potential for project audibility impacts to Japanese American and Minidoka-connected communities visiting the Minidoka NHS is described in Section 3.6.1.2.2.

[47] Audibility and visual impacts to Minidoka NHS that could affect the setting, feeling, and overall visitor experience are described in detail in Section 3.5.5.2.2.

healing and learning should be considered in the context of the proposed project and in future communication" (BLM 2022).

3.19.2.1 Alternative A (No Action)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and the Minidoka NHS interpretive purpose would only be impacted by existing and future trends and actions.

3.19.2.2 Alternative B (Proposed Action)

As described above, Alternative B would result in visual and auditory effects to the Minidoka NHS interpretive purpose and visitor experience because of changes to the cultural landscape, viewshed, and soundscape when compared to the No Action Alternative. These changes would also affect the environmental justice education Minidoka NHS conveys through its interpretive purpose and visitor experience. Turbine towers and blades and transmission structures would represent the most prominent sources of potential visual impacts to Minidoka NHS; these project components are shown in geographic relation to Minidoka NHS in Figure 3.19-11.

Section 3.6.1.2.2 describes the impacts to the Japanese American and Minidoka-connected communities would result from project-related effects to resources of concern, including the original Minidoka WRC and Minidoka NHS.

The degree of daytime visual change potentially affecting the Minidoka NHS interpretive purpose themes (story of relocation, living conditions, work performed, and contributions to the military) are summarized in Table 3.19-2 according to the potential visual impacts as viewed from the Minidoka NHS KOPs and potential noise impacts. Visual sensitivity reflects attitudes and perceptions held by people regarding a landscape and generally reflects the public's level of sensitivity for landscape changes. Each KOP simulation represents one single-frame view; however, in assessing the overall perceived impact from project turbines and blades, the landscape level change is used and the most severe visual change rating of all three KOPs influenced the "overall impact" (see Table 3.19-2). Table F-1 in SWCA (2024) summarizes, per Minidoka NHS KOP and per action alternative (regardless of turbine size), the maximum scenario for the number of turbines on the horizon using a GIS terrain analysis. This terrain analysis does not account for intervening structures or vegetation present on the landscape, nor atmospheric conditions, that could influence visibility. The GIS terrain analysis for Alternative B estimated the maximum number of turbines on the horizon at 400 from the Visitor Center (KOP 1), 367 from the restored Block 22 Barracks (KOP 2), and 400 from the Honor Roll (KOP 16) (see additional details in Appendix F of SWCA [2024]).

Under Alternative B, there would be a major degree of visual change in the environmental setting (see Table 3.19-2). The environmental setting and feeling are integral to conveying the Minidoka NHS interpretive purpose and the significance for which the historic site was established as further described in Section 3.5.2 and Section 3.20 in EIS Appendix 9. The setting and feeling would also be adversely affected by increased noise and shadow flicker which in turn would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Without these experiences, the ability for visitors to better understand and connect with the daily lives of those who were incarcerated, and to engage in remembrance and healing, would be compromised or eliminated.

The degree of visual prominence is lessened with distance. See Table 3.19-2 for the nearest turbine siting corridor to any Minidoka NHS properties (developed or undeveloped portion) under Alternative B. Further detail is provided in Section 3.16.1.2.2. Alternative B would impact 4,449 acres of Minidoka

WRC associated with Minidoka NHS. The closest proposed turbine to the currently undeveloped northwest portion of the Minidoka NHS property could be located 0.6 mile away and could result in shadow flicker at this property for up to 30 hours per year under both evaluated turbine sizes (the 3-MW and 6-MW turbines). Although undeveloped to date, this additional shadow flicker would limit the NPS's future actualization of this property for additional visitor education and experience and implementation of the Minidoka NHS interpretive purpose.

For auditory impacts, the acoustic environment at Minidoka NHS was modeled at 6.0 dBA above the natural ambient sound level (NPS 2015). During the 3-year construction and decommissioning phases, noise from project blasting and traffic could impact the Minidoka NHS interpretive purpose. The area of general construction noise (i.e., the area within 6.8 miles of the siting corridors) includes areas where blasting noise would be audible. The results of the noise technical report (SWCA 2022) indicate that operational noise levels near Minidoka NHS would range from 4.6 to 12.5 dBA above existing background levels. As noted in Section 3.6.1.2.2 (noise impacts on the Japanese American and Minidoka-connected communities), although these operational noise levels are all below the EPA's recommended noise standard of 55 dBA for residential land uses, the increased noise levels from turbines above existing conditions could be perceptible from Minidoka NHS. Because of the importance of the existing soundscape to the setting and overall visitor experience of remoteness, isolation, abandonment, reflection, and healing, such an increase in sound as experienced over the 30 years of operation would result in an adverse audible impact to the Minidoka NHS interpretive ability to effectively convey the story of the relocation, living conditions, work performed, and contributions to the military. Audible impacts would result within up to 2.2 miles from the turbine corridors.

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Figure 3.19-11. Minidoka National Historic Site and alternatives.

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3.19.2.2.1 THE STORY OF THE RELOCATION

The Minidoka NHS entrance near the Honor Roll is a key feature. It provides immersion into the setting the WWII incarcerees would have entered and their experience upon arrival at Minidoka WRC. The story of relocation and visitor experience would be diminished by visual and auditory impacts from the project components, specifically wind turbines, in the surrounding landscape. The open views would have turbines in the immediate foreground (as shown in the Honor Roll [KOP 16] simulations for Alternative B), and the turbines could be audible because the closest turbine could be 1.5 miles away, within the 2.2-mile auditory APE. The remoteness of the site would be diminished by these additional vertical structures. This change to the remoteness would impact the NPS's interpretive ability to provide a strong sense of the arrival and transition experience and to promote public understanding of the legacy and relevance of Minidoka NHS as it pertains to contemporary and future civil and constitutional rights issues, people, place, and WWII.

3.19.2.2.2 LIVING CONDITIONS

The ability to interpret the story of the living conditions would be further altered through changes in the Minidoka NHS views and soundscape. The views assist visitors in viewing the cultural landscape and feeling the sense of isolation described by those incarcerated at Minidoka WRC. These views include views to farms, geologic features, and distant mountains. Figure 3.5-5 shows the restored Block 22 Barracks (KOP 2) illustrating the simulated worst-case condition for Alternative B with 6-MW wind turbines, as viewed from KOP 2 at a nearest distance of 5.0 miles from the KOP based on viewer orientation. The living conditions and visitor experience at the restored Block 22 Barracks (KOP 2) would be diminished by visual and auditory impacts from the introduction of project components, specifically wind turbines, in the surrounding cultural landscape and viewshed and soundscape. With turbines visible and potentially audible, these impacts would affect the NPS's interpretive ability to provide visitors with an opportunity to focus on the sense of confinement and to quietly reflect upon the full viewshed of the incarceration site, including the extents of the historic residential housing blocks and the outlying open and expansive high desert environment.

3.19.2.2.3 THE WORK PERFORMED

Adding turbines to the viewshed and soundscape would alter the agricultural character of the landscape's immediate foreground, impacting the NPS's ability to interpret how the work of incarcerees transformed the arid landscape into irrigated agricultural fields in and around Minidoka NHS and thus contributed to the present-day agricultural landscape. The irrigated fields and agricultural landscape remain as an enduring legacy of the unconstitutionally incarcerated Nikkei communities. The remote setting and open expanse of agricultural fields serve as a central characteristic of Minidoka NHS's integrity and historical significance. Changes to the views from all KOPs would diminish the NPS's interpretive ability to provide visitors with an understanding of the extent of Minidoka's WWII farm operations, the opportunity to view the preserved cultural landscape while walking along historic incarceration site pathways, and the opportunity to see and experience a visual connection to the present-day agricultural landscape.

3.19.2.2.4 CONTRIBUTIONS TO THE MILITARY

The view at the Honor Roll (KOP 16) would change and impact the ability of the NPS to interpret the contributions to the military of those incarcerated at Minidoka and to interpret the contradiction of loyal U.S. citizens being imprisoned. The visitor experience at the Honor Roll (KOP 16) would be diminished by visual and auditory impacts from the introduction of project components, specifically wind turbines, in the surrounding landscape. These changes would diminish the NPS's ability to provide visitors with an opportunity for individual contemplation and personal reflection in a location honoring Japanese American WWII veterans.

With the degradation of the cultural landscape and viewshed and soundscape described above, the four themes of site significance (NPS 2006) (civil and constitutional rights, people, place, and WWII) would still be conveyed at Minidoka NHS, but their meaning would be diminished in a landscape with the addition of wind turbines. Instead of the remote agricultural setting contributing to visitors' comprehension of these themes, the added viewshed industrialization and additional noise would reduce the efficacy of the NPS's public education and interpretation of the exclusion and unjust incarceration of Japanese American citizens during WWII (NPS 2016).

Alternative B project impacts would alter and diminish the Minidoka NHS visitor experience and interpretive purpose. The impacts would result in fewer opportunities for public education and interpretation of the exclusion and unjust incarceration of Nikkei (Japanese American citizens and legal residents of Japanese ancestry) during WWII. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose. Impacts from Alternative B due to visual disruption and noise introduced into the cultural landscape, viewshed, and soundscape would result in impacts to the Minidoka NHS visitor experience and interpretive purpose. The change in the environmental setting and feeling from Alternative B would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. The changes from Alternative B would diminish the ability of the Japanese American community to benefit from healing rituals and practices centered around Minidoka NHS.

Table 3.19-2. Summary of Potential Impacts to Minidoka National Historic Site Interpretive Themes

Minidoka NHS Interpretive Themes	Alternative B (Proposed Action)	Alternative C (Reduced Western Corridors)	Alternative D (Centralized Corridors)	Alternative E (Reduced Southern Corridors)	Preferred Alternative
Distance from Nearest Turbine Siting Corridor to NPS Properties	0.6 mile to undeveloped portion 1.1 mile to developed portion Shadow flicker would affect portions of Minidoka NHS within 1.5 miles of turbines.	5.3 mile to undeveloped portion 5.4 mile to developed portion	5.3 mile to undeveloped portion 5.4 mile to developed portion	7.7 mile to undeveloped portion 8.1 mile to developed portion	8.5 mile to undeveloped portion 8.8 mile to developed portion
Degree of Daytime Visual Change Potentially Affecting Minidoka NHS Interpretive Themes					
The story of relocation	Honor Roll (KOP 16): Major	KOP 16: Major	KOP 16: Major	KOP 16: Moderate	KOP 16: Moderate
Living conditions	Visitor Center (KOP 1): Major Restored Block 22 Barracks (KOP 2): Major	KOP 1: Moderate KOP 2: Major	KOP 1: Moderate KOP 2: Major	KOP 1: Moderate KOP 2: Minor	KOP 1: Moderate KOP 2: Minor
The work performed	Visitor Center (KOP 1): Major Restored Block 22 Barracks (KOP 2): Major Honor Roll (KOP 16): Major	KOP 1: Moderate KOP 2: Major KOP 16: Major	KOP 1: Moderate KOP 2: Major KOP 16: Major	KOP 1: Moderate KOP 2: Minor KOP 16: Moderate	KOP 1: Moderate KOP 2: Minor KOP 16: Moderate
Contribution to the military	Honor Roll (KOP 16): Major	KOP 16: Major	KOP 16: Major	KOP 16: Moderate	KOP 16: Moderate
Project Noise Potentially Affecting Minidoka NHS Interpretive Themes					
The story of relocation	Construction and operation noise	Construction noise only	Construction noise only	Construction noise only	Construction noise only
Living conditions	Construction and operation noise	Construction noise only	Construction noise only	Construction noise only	Construction noise only
The work performed	Construction and operation noise	Construction noise only	Construction noise only	Construction noise only	Construction noise only
Contribution to the military	Construction and operation noise	Construction noise only	Construction noise only	Construction noise only	Construction noise only
Overall Impact to visitor experience and NPS ability to implement Minidoka NHS interpretive themes	Addition of turbines to the viewshed and soundscape would strongly attract attention and dominate views from Minidoka NHS because of the turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Addition of turbines to the viewshed would strongly attract attention and dominate views from Minidoka NHS because of the turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Addition of turbines to the viewshed would strongly attract attention and dominate views from Minidoka NHS because of the turbines' apparent size. This level of visual change would alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. Project impacts would result in a major degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose.	Addition of turbines to the viewshed would be plainly visible, but would not strongly attract attention, nor dominate views, from Minidoka NHS because of the turbines' apparent size. This level of visual change would potentially alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.	Addition of turbines to the viewshed would be plainly visible, but would not strongly attract attention, nor dominate views, from Minidoka NHS because of the turbines' apparent size. This level of visual change would potentially alter and diminish the visitor experience and the four interpretive themes: the story of the relocation, the living conditions, the work performed, and the contribution to the military. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impact to Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.

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3.19.2.2.5 ALTERNATIVE B WITH ADDITIONAL MEASURES

In addition to applicant-committed measures and mitigation required by BLM policy (see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to the MNHS interpretive purpose under Alternative B. Although these measures are not included as part of Alternative B, these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for Minidoka NHS interpretive purpose are summarized in Table 3.19-3 and detailed in Table App4-4 in EIS Appendix 4. Since these measures would reduce fugitive dust and project visibility, they would also reduce impacts to the Minidoka NHS interpretive purpose and visitor experience. Implementation of additional project-specific mitigation measures qqq, rrr, and sss under Alternative B would further reduce or avoid visual impacts to the Minidoka NHS interpretive purpose and visitor experience.

Table 3.19-3. Mitigation for Minidoka National Historic Site Interpretive Purpose

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
As described for cultural resources (Section 3.5.5; Table 3.5-8), environmental justice communities (Section 3.6.1; Table 3.6-5), and visual resources (Section 3.16.1; Table 3.16-9)	As described for cultural resources (Section 3.5.5; Table 3.5-8), environmental justice communities (Section 3.6.1; Table 3.6-5), and visual resources (Section 3.16.1; Table 3.16-9)	As described for cultural resources (Section 3.5.5; Table 3.5-8), environmental justice communities (Section 3.6.1; Table 3.6-5), and visual resources (Section 3.16.1; Table 3.16-9)

Note: All measures are detailed in EIS Appendix 4.

The BLM has been and would continue to coordinate with the NPS regarding adverse impacts to the Minidoka NHS visitor experience and interpretive purpose, specifically, impacts to visitors' experience of the story of the relocation, living conditions, work performed, and contributions to the military.

3.19.2.3 Alternative C (Reduced Western Corridors)

As described in Section 3.6.1.2.3 (Japanese American and Minidoka-Connected Communities), Alternative C reduces the amount of siting corridors in the original Minidoka WRC that would be nearest to and in the most prominent viewing directions of Minidoka NHS (see Figure 3.19-11), which would minimize and avoid visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC and resulting effects on the overall visitor experience. Compared to Alternative B, the degree of visual change for viewers at the Minidoka NHS Visitor Center (KOP 1) (see Table 3.19-2) would be reduced from major to moderate. Given the increased distance between the siting corridors and Minidoka NHS, construction and operation noise levels at Minidoka NHS would be far less perceptible and mainly limited to traffic noise and blasting, and shadow flicker would not likely affect Minidoka NHS but may still affect portions of the larger WRC. Alternative C would result in no shadow flicker or auditory impacts. This would be a 100% reduction in potential shadow flicker impacts (to the currently undeveloped NPS property) and auditory impacts at Minidoka NHS when compared to Alternative B. As indicated in Table F-1 in SWCA (2024), Alternative C would reduce the maximum number of turbines on the horizon compared to Alternative B and would therefore have less of an impact to the Minidoka NHS interpretive purpose and visitor experience than Alternative B.

Table 3.19-2 summarizes the degree of daytime visual change potentially affecting the Minidoka NHS interpretive purpose themes (the story of relocation, living conditions, work performed, and contributions to the military) according to the potential visual impacts as viewed from the simulations for the Minidoka NHS KOPs. The GIS terrain analysis for Alternative C estimated the maximum number of turbines on the horizon at 341 from the Visitor Center (KOP 1), 325 from the restored Block 22 Barracks (KOP 2), and 343 from the Honor Roll (KOP 16) (see additional details in Appendix F of SWCA [2024]). Although this visual analysis does not account for intervening structures or vegetation on the landscape or variability in atmospheric conditions, these factors would contribute to lessening the visibility of turbines that are farther away from the Minidoka NHS.

Under Alternative C, the landscape would appear heavily altered. Project components would introduce elements and/or patterns that are uncommon or not found in the landscape and would create disharmony and strong contrast when viewed by visitors at Minidoka NHS. The cultural landscape would appear severely altered because of the dominance of the wind turbines on the horizon. The environmental setting and feeling are integral to conveying the Minidoka NHS interpretive purpose and the significance for which the site was established. The setting and feeling would be adversely affected by changes to the visual character of the analysis area, which in turn would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Without these experiences, the ability for visitors to better understand and connect with the daily lives of those who were incarcerated, and to engage in remembrance and healing, would be compromised or eliminated. These visitor experiences are also essential to achieving the purpose of Minidoka NHS and maintaining its significance as a historic site. Adverse effects to Minidoka NHS would also have the potential to cause psychological harm to members of the Japanese American and Minidoka-connected communities by perpetuating and reinforcing existing feelings of distrust and being dishonored within these communities (BLM 2022).

The degree of visual prominence is lessened with distance. See Table 3.19-2 for the nearest turbine siting corridor to any Minidoka NHS properties (developed or undeveloped portion) under Alternative C. Corridors would be located a minimum of 4.7 miles further from Minidoka NHS properties than under Alternative B. Further detail is provided in Section 3.16.1.2.3. Alternative C siting corridors would overlap 690 acres of Minidoka WRC; portions of corridors were removed from within the historic Minidoka WRC associated with Minidoka NHS. Visual impacts would be reduced at Minidoka NHS Honor Roll (KOP 16) and restored Block 22 Barracks (KOP 2) relative to Alternative B, with views blocked by some intervening topography and signage related to the Honor Roll. From the Minidoka KOPs, the project components would appear smaller on the horizon due to the increased distance to each KOP compared to Alternative B, and the visual dominance of the project would be reduced at each KOP.

3.19.2.3.1 THE STORY OF THE RELOCATION

Although the nearest Alternative C turbine siting corridor would be 4.6 miles farther from Minidoka NHS than under Alternative B, the degree of visual change would remain major, as indicated in Table 3.19-2 for KOP 16 (Honor Roll). Similar to Alternative B, the remoteness of the site would be diminished by the turbines added on the horizon. This would impact the NPS's interpretive ability to provide a strong sense of arrival and transition experience and promote public understanding of the legacy and relevance of Minidoka NHS as it pertains to contemporary and future civil and constitutional rights issues, people, place, and WWII.

3.19.2.3.2 LIVING CONDITIONS

The degree of visual change would be less from Alternative C at the Visitor Center (KOP 1) than from Alternative B; this change to how the landscape is viewed would be moderate instead of major (see Table 3.19-2). The ability to interpret the story of the living conditions through views from Minidoka NHS would not be altered as severely from Alternative C as it would be from Alternative B. However, this change to how the landscape is viewed would be major from both Alternatives B and C at restored Block

22 Barracks (KOP 2). These views assist visitors in viewing the cultural landscape and feeling the sense of isolation described by those incarcerated at Minidoka WRC. Visible turbines would affect the NPS's interpretive ability to provide visitors with an opportunity to focus on the sense of confinement and to reflect upon the full viewshed of the incarceration site, including the extents of the historic residential housing blocks and the outlying open and expansive high desert environment.

3.19.2.3.3 THE WORK PERFORMED

Adding turbines to the viewshed would alter the agricultural character of the landscape's immediate foreground, impacting the NPS's ability to interpret how the work of incarcerees transformed the arid landscape into irrigated agricultural fields. Similar to Alternative B, the landscape, as viewed from KOPs 2 and 16, would experience major visual change, whereas KOP 1 would have moderate, instead of major change. These changes to the views from Minidoka NHS would diminish the NPS's interpretive ability to provide visitors with an understanding of the extent of Minidoka's WWII farm operations and the opportunity to experience a visual connection to the present-day agricultural landscape.

3.19.2.3.4 CONTRIBUTIONS TO THE MILITARY

Similar to Alternative B, under Alternative C, the view at the Honor Roll (KOP 16) would experience major change with turbines visible on the horizon, impacting the ability of the NPS to interpret the contributions to the military of those incarcerated at Minidoka and to interpret the contradiction of loyal U.S. citizens being imprisoned. These changes would diminish the NPS's ability to provide visitors with an opportunity for individual contemplation and personal reflection in a location honoring Japanese American WWII veterans.

Similar to Alternative B, Alternative C project impacts would alter and diminish the Minidoka NHS visitor experience and interpretive purpose. Project impacts would result in a degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose. Impacts from Alternative C due to visual disruption of the cultural landscape and viewshed would result impacts to the Minidoka NHS visitor experience and interpretive purpose. The change in the environmental setting and feeling from Alternative C would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Further alteration of the cultural landscape and viewshed would alter the visitor experience of the story of the relocation, living conditions, work performed, and contribution to the military of Minidoka WRC incarcerees. The changes from Alternative C would diminish the ability of the Japanese American community to benefit from healing rituals and practices centered around Minidoka NHS.

3.19.2.4 Alternative D (Centralized Corridors)

As described in Section 3.6.1.2.4 (Japanese American and Minidoka-Connected Communities), Alternative D would eliminate nearly all of the same western siting corridors that are eliminated under Alternative C, and additionally would not include most of the siting corridors east of Crestview Road (see Figure 3.19-11). Both Alternatives C and D would reduce the number of corridors on the western edge of the project; therefore, the magnitude of potential visual, noise, and traffic effects to Minidoka NHS and the original Minidoka WRC, and resulting effects on the overall visitor experience, would be the same as Alternative C (see Table 3.19-2).

Similar to Alternative C, turbines would not be sited close enough to any Minidoka NHS properties to result in shadow flicker or auditory impacts. As indicated in Table F-1 in SWCA (2024), Alternative D would reduce the maximum number of turbines on the horizon compared to Alternatives B and C and would therefore have less of an impact to the Minidoka NHS interpretive purpose than Alternative B or C.

Under Alternative D, the impacts would be similar to Alternative C (reduced from Alternative B) but with a reduction in the maximum total turbines on the horizon as viewed from the Minidoka KOPs (Table F-1 in SWCA [2024]). Table 3.19-2 summarizes the degree of daytime visual change potentially affecting the Minidoka NHS interpretive purpose themes (the story of relocation, living conditions, work performed, and contributions to the military) according to the potential visual impacts as viewed from the simulations for the Minidoka NHSKOPs. The GIS terrain analysis for Alternative D estimated the maximum number of turbines on the horizon at 280 from the Visitor Center (KOP 1), from the restored Block 22 Barracks (KOP 2), and from the Honor Roll (KOP 16); see additional details in Appendix F of SWCA [2024]). Although this GIS terrain analysis does not account for intervening structures or vegetation on the landscape or variability in atmospheric conditions, these factors would contribute to lessening the visibility of turbines that are farther away from the Minidoka NHS.

Under Alternative D, the cultural landscape would appear to be severely altered because of the dominance of the wind turbines on the horizon. The setting and feeling would be adversely affected by changes to the visual character of the analysis area, which in turn would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing.

The degree of visual prominence is lessened with distance. See Table 3.19-2 for the nearest turbine siting corridor to any Minidoka NHS properties (developed or undeveloped portion) under Alternative D. Same as Alternative C, corridors would be located a minimum of 4.7 miles further from Minidoka NHS properties, than under Alternative B. Further detail is provided in Section 3.16.1.2.4. Alternative D would eliminate nearly the same turbine siting corridors causing visual change impacts that are also eliminated under Alternative C. Under Alternative D, siting corridors would overlap with 1,759 acres of Minidoka WRC; portions of corridors were removed from within the historic Minidoka WRC associated with Minidoka NHS. Under Alternative D, visual impacts seen from the Visitor Center (KOP 1) would be the same as Alternative C but reduced when compared to Alternative B. Similar to Alternative C, the visual impacts associated with Alternative D would be reduced at Minidoka NHS Honor Roll (KOP 16) and at the restored Block 22 Barracks (KOP 2) relative to Alternative B.

Similar to Alternative C, Alternative D project impacts would alter and diminish the Minidoka NHS visitor experience and interpretive purpose. Project impacts would result in a degree of change to landscape character and scenic quality, and that change would impact the Minidoka NHS interpretive purpose. Impacts from Alternative D due to visual disruption of the cultural landscape and viewshed would result in impacts to the Minidoka NHS visitor experience and interpretive purpose. The change in the environmental setting and feeling from Alternative D would diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Further alteration of the cultural landscape and viewshed would alter the visitor experience of the story of the relocation, living conditions, work performed, and contribution to the military of Minidoka WRC incarcerees. The changes from Alternative D would diminish the ability of the Japanese American community to benefit from healing rituals and practices centered around Minidoka NHS.

3.19.2.5 Alternative E (Reduced Southern Corridors)

Alternative E would completely avoid any development within the original Minidoka WRC (see Figure 3.19-11) and would reduce the potential for visual, noise, and traffic effects to Minidoka NHS and Minidoka WRC and resulting effects on the overall visitor experience relative to Alternatives B, C, and D. Compared to Alternatives B, C, and D, the degree of visual changes for viewers at Minidoka NHS and Minidoka WRC would be reduced from major to moderate or minor for some or all viewers (see KOPs 1, 2, and 16 in Table 3.19-2), and the potential for noise and traffic effects would be further reduced due to the elimination of any siting corridors or haul routes from Minidoka WRC. Construction noise would be largely imperceptible within both Minidoka NHS and WRC, except for traffic and blasting noise, and operational noise levels would be the second lowest of all action alternatives. In addition, there would be no shadow flicker effects in Minidoka NHS or WRC.

Similar to Alternatives C and D, Alternative E turbines would not be sited close enough to any Minidoka NHS properties to result in shadow flicker or auditory impacts. The reduction in turbines on the horizon is approximately 40% less in Alternative E when compared to Alternative B. As indicated in Table F-1 in SWCA (2024), Alternative E would reduce the maximum number of turbines on the horizon compared to Alternatives B, C, and D, and therefore Alternative E would have less of an impact to the Minidoka NHS interpretive purpose than Alternatives B, C, and D.

Compared to those of Alternatives B, C, and D, Alternative E turbines would be visible in a lesser range of vision (in a 60 degree arc) to the northeast of KOP 1 and across up to 15 miles of the horizon, which would occupy only half of the human (120 degree) field of vision. Much of this horizon is masked by near view existing development including trees. Under Alternative E, the impacts would be similar to Alternative C (and reduced from Alternative B) but with a reduction in the maximum total turbines on the horizon as viewed from the Minidoka KOPs (see Table F-1 in SWCA [2024]). The reduction is approximately 30% less in Alternative E when compared to Alternative C. Visual impacts would include the daytime visibility of turbines and the nighttime visibility of project lights, such as aviation warning lights on turbines. The impacts described in detail elsewhere in Sections 3.5 (Cultural Resources), 3.6.1 (Environmental Justice Communities), and 3.16 (Visual Resources) also provide assessments of potential impacts to Minidoka NHS. Table 3.19-2 summarizes the degree of daytime visual change potentially affecting the Minidoka NHS interpretive purpose themes (the story of relocation, living conditions, work performed, and contributions to the military) according to the potential visual impacts as viewed from the Minidoka NHS KOPs. The GIS terrain analysis for Alternative E estimated the maximum number of turbines on the horizon at 232 from the Visitor Center (KOP 1), 216 from the restored Block 22 Barracks (KOP 2), and 234 from the Honor Roll (KOP 16) (see additional details in Appendix F of SWCA [2024]). Although this visual analysis does not account for intervening structures or vegetation on the landscape or variability in atmospheric conditions, these factors would contribute to lessening the visibility of turbines that are farther away from the Minidoka NHS.

Under Alternative E, the cultural landscape would appear altered because of the presence of the wind turbines on the horizon. The setting and feeling would be adversely affected by changes to the visual character of the analysis area, which in turn would potentially diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing.

The degree of visual prominence is lessened with distance. See Table 3.19-2 for the nearest turbine siting corridor to any Minidoka NHS properties (developed or undeveloped portion) under Alternative E. Corridors would be located a minimum of 7.1 miles further from Minidoka NHS properties, than under Alternative B. Further detail is provided in Section 3.16.1.2.5. Under Alternative E, visual impacts as seen from the Minidoka NHS KOPs would be less than under Alternative B, C, or D. Alternative E siting corridors would overlap 165 acres of the original Minidoka WRC; portions of corridors were removed from within the original Minidoka WRC associated with the existing Minidoka NHS.

The potential impacts would be reduced compared to Alternatives B, C, and D, and the overall visual impact would be moderate (see Table 3.19-2). The change in the environmental setting and feeling from Alternative E would potentially diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Further alteration of the cultural landscape and viewshed would alter the visitor experience of the story of the relocation, living conditions, work performed, and contribution to the military of Minidoka WRC incarcerees. The changes from Alternative E would potentially diminish the ability of the Japanese American community to benefit from healing rituals and practices centered around Minidoka NHS. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to the Minidoka NHS interpretive purpose would be less than the impacts described for Alternatives B, C, and D.

3.19.2.6 Preferred Alternative

The Preferred Alternative has the smallest siting corridor footprint of all action alternatives and eliminates all but one string of turbines from the immediate foreground and foreground of Minidoka NHS (see Figure 3.19-11) in order to further avoid and minimize potential impacts to the setting and feeling of Minidoka NHS. The one string of turbines that remains within the foreground is located approximately 9.2 miles from the Minidoka NHS Visitor Center and is obstructed (when viewed from KOPs) by existing infrastructure on adjacent farmland. The siting corridors for the Preferred Alternative were also adjusted to maximize the number of turbines that would be hidden or mixed in with existing obstructions from Minidoka-related KOPs 1, 2, and 16 (see Figures 3.19-6, 3.19-8, and 3.19-10).

Compared to all other action alternatives, the Preferred Alternative would reduce to the greatest degree the potential for visual and noise effects and eliminate traffic effects to Minidoka NHS and the original Minidoka WRC and resulting effects on the overall visitor experience. Compared to Alternatives B, C, and D, the degree of visual changes for viewers at Minidoka NHS and Minidoka WRC would be reduced from major to moderate or minor for some or all viewers (see Table 3.19-2), and the potential for noise effects would be further reduced relative to all action alternatives due to the elimination of siting corridors from the immediate foreground and foreground of the Minidoka NHS. Construction noise would be largely imperceptible within both Minidoka NHS and WRC, except for blasting noise, and operational noise levels would be the lowest of all action alternatives. In addition, there would be no traffic effects, due to the absence of any access routes intersecting Minidoka NHS or WRC, and there would be no shadow flicker effects in Minidoka NHS or WRC.

Under the Preferred Alternative, visual impacts as seen from the Minidoka NHS Visitor Center (KOP 1) would be shifted to the farther reaches of foreground distances, and extended into the middleground. Preferred Alternative turbines would be visible in the smallest range of vision (in a 55 degree arc) to the northeast of KOP 1 and across up to 12 miles of the horizon, which would occupy less than half of the human (120 degree) field of vision. Much of this horizon is masked by near-view existing development, including trees. Similar to Alternatives C, D, and E, turbines would not be sited close enough to any Minidoka NHS properties to result in shadow flicker or auditory impacts. The reduction in turbines on the horizon is approximately 50% less in the Preferred Alternative when compared to Alternative B. As indicated in Table F-1 in SWCA (2024), the Preferred Alternative would reduce the maximum number of turbines compared to Alternatives B, C, D, and E, and therefore, of all action alternatives, the Preferred Alternative would have the lowest impact to the Minidoka NHS interpretive purpose and visitor experience.

Table 3.19-2 summarizes the degree of daytime visual change potentially affecting the Minidoka NHS interpretive purpose themes (the story of relocation, living conditions, work performed, and contributions to the military) according to the potential visual impacts as viewed from the Minidoka NHS KOPs. The GIS terrain analysis for the Preferred Alternative estimated the maximum number of turbines on the horizon at 196 from the Visitor Center (KOP 1), 179 from the restored Block 22 Barracks (KOP 2), and 200 from the Honor Roll (KOP 16) (see additional details in Appendix F of SWCA [2024]). Although this visual analysis does not account for intervening structures or vegetation on the landscape or variability in atmospheric conditions, these factors would contribute to lessening the visibility of turbines that are farther away from the Minidoka NHS.

Under the Preferred Alternative, the cultural landscape would appear altered because of the presence of the wind turbines on the horizon. The setting and feeling would be adversely affected by changes to the visual character of the analysis area, which in turn would potentially diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. Given the importance of environmental setting and feeling to the visitor experience of remoteness, isolation, abandonment, reflection, and healing at these sites, any adverse effects to the baseline soundscape or landscape would constitute a disproportionately high and adverse effect on the Japanese American community.

The degree of visual prominence is lessened with distance. See Table 3.19-2 for the nearest turbine siting corridor to any Minidoka NHS properties (developed or undeveloped portion) under the Preferred Alternative. Further detail is provided in Section 3.16.1.2.6. Corridors would be located a minimum of 7.9 miles further from Minidoka NHS properties than under Alternative B. Further detail is provided in Section 3.16.1.2.2. Under the Preferred Alternative, visual impacts as seen from the Minidoka NHS KOPs would be less than under Alternative B, C, D, or E. Under the Preferred Alternative, there would be no turbines, access roads, or other ancillary facilities located in the original Minidoka WRC associated with the existing Minidoka NHS.

The potential impacts would be reduced compared to Alternatives B, C, and D, and the overall visual impact would be moderate (see Table 3.19-2). Further alteration of the cultural landscape and viewshed would alter the visitor experience of the story of the relocation, living conditions, work performed, and contribution to the military of incarcerees of Minidoka WRC, as interpreted at Minidoka NHS. The change in the environmental setting and feeling from the Preferred Alternative would potentially diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. The changes from the Preferred Alternative would potentially diminish the ability of the Japanese American community to benefit from healing rituals and practices centered around Minidoka NHS. However, the distance of the closest turbines would be 3 to 7 miles further away from Minidoka NHS than Alternatives B, C, and D, which would reduce the potential for impacts to the Minidoka NHS interpretive purpose. Because the project would not strongly attract attention or dominate views, the impacts to the Minidoka NHS interpretive purpose would be less than impacts described for Alternatives B, C, and D.

3.19.2.7 Cumulative Impacts

Existing and future actions that would alter the Minidoka NHS cultural landscape, viewshed, and soundscape include agricultural land use, private property development, livestock grazing and associated infrastructure, motorized access, existing and proposed linear features (e.g., roads, transmission lines, railroads), electrical substations, existing and proposed wind and solar development, irrigation canals, aquifer recharge sites and monitoring wells, ESR and vegetation treatment projects, and existing ROW projects. Ongoing population growth would also continue to influence private property development and infrastructure development.

Reasonably foreseeable transportation, electrical infrastructure, and wind and solar development projects would adversely affect the Minidoka NHS interpretive purpose through increased light pollution, noise, and visual effects on the setting and feeling of Minidoka NHS. The environmental setting and feeling of Minidoka NHS would be adversely affected by increased noise and changes to the visual character and inherent scenic quality of the analysis area, which in turn would potentially diminish the overall visitor experience of remoteness, isolation, abandonment, reflection, and healing. The intensity of impacts would vary depending on the proximity of planned actions to Minidoka NHS. WEC and SWIP-North would have the greatest potential impacts because these are large infrastructure projects that intersect or are near Minidoka NHS. The Taurus Wind Project, WEC, and SWIP-North would result in cumulative visual impacts to Minidoka NHS when combined with the action alternatives.

The trend for future growth of the Twin Falls metropolitan area and surrounding communities, along with increased renewable energy development in the CRMO and Minidoka NHS nightscapes, would have additive or synergistic effects in combination with the Lava Ridge Wind Project, especially when the wind projects' ADLS are activated during operation. These would add lighting to currently darker portions of the CRMO and Minidoka NHS nightscapes.

Because the Japanese American community has repeatedly expressed its concerns over the effects of development projects on Minidoka NHS and Minidoka WRC, any future proposals for development in the area would be seen as an affront to their community and a continuation of the injustice that Minidoka NHS represents. Any cumulative adverse impacts to Minidoka NHS and Minidoka WRC could therefore cause psychological harm to members of the Japanese American community by 1) perpetuating and reinforcing existing feelings of injustice, distrust, being dishonored, betrayal, resentment, and anger at the desecration of the site and their families' and community's historical and continued injustice and by 2) potentially diminishing the ability of the community to benefit from healing rituals and practices centered around Minidoka NHS. Cumulative adverse effects of reasonably foreseeable development projects on the Minidoka NHS and Minidoka WRC experience or to the psychological well-being of the Japanese American and Minidoka-connected communities themselves would also potentially diminish the ability to include Japanese American and AANHPI-centered stories in "America's changing commemorative landscape" (see Section 3.6.1.1.1).

At Minidoka NHS, the cultural landscape, viewshed, and soundscape are fundamental resources associated with the incarceration period (1942–1945), and cumulative adverse impacts through further alteration of the cultural landscape, viewshed, and soundscape would alter the visitor experience of the story of the relocation, living conditions, work performed, and contribution to the military of incarcerees.

Although the four themes of Minidoka NHS site significance (civil and constitutional rights, people, place, and WWII) would still be conveyed at Minidoka NHS, cumulative adverse impacts would potentially diminish their meaning as interpreted by visitors. Instead of the remote agricultural setting contributing to the Minidoka NHS visitor experience and interpretive purpose, the added industrialization would reduce the efficacy of the NPS's public education and interpretation of the exclusion and unjust incarceration of Japanese American citizens during WWII.

3.19.3 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

An irretrievable commitment of Minidoka NHS education and interpretation and visitor experience would occur under all action alternatives for up to 36 years (for project construction, operation, and decommissioning) due to visual and auditory impacts from installation of new vertical aboveground infrastructure. The duration of auditory impacts (from Alternative B only) from project infrastructure would be the 30-year operation phase. Non-physical impacts would be both short term during construction and decommissioning and long term during operation. Long-term effects (visual and auditory impacts) on the preservation of cultural resources would persist until operations cease and the aboveground infrastructure is removed. This would include related irreversible effects to significant cultural resources for the Japanese American community. Visual and auditory effects would be both short term during construction and decommissioning and long term during operation. Long-term effects (visual, and auditory impacts from Alternative B only) on the Minidoka NHS interpretive purposes would persist until operations cease and the aboveground infrastructure is removed. This would include related irreversible impacts to the Japanese American and Minidoka-connected communities.

3.19.4 Compensatory Mitigation

Even with the implementation of avoidance, minimization (through alternatives development and removing turbine corridors closest to the Minidoka NHS), and mitigation measures (see EIS Appendix 4), residual impacts to the Minidoka NHS interpretive purpose could still occur and would require compensatory mitigation. Please refer to measure VII in Table App4-5 and the Mitigation Framework for Key Resources and Values Associated with Minidoka NHS section in EIS Appendix 4 for more information.

Implementation of compensatory mitigation measure VII would not directly reduce any project-related effects but would aim to compensate for project-related effects indirectly, by funding projects recommended by a Minidoka NHS stakeholder committee. The BLM and the Office of Collaborative Action and Dispute Resolution have implemented proactive approaches to solicit input on the EIS from members of the Japanese American and Minidoka-connected communities. Additional mitigation measures would be discussed with these communities and the NPS for adverse effects to the Minidoka NHS interpretive purpose.

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APPENDIX 9

Additional Background Information

CONTENTS

Figures

Tables

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INTRODUCTION

This appendix provides additional background information for issues determined to have significant impacts. Because these sections were originally part of Chapter 3 of the environmental impact statement (EIS), chapter and section naming and numbering were maintained for simplicity. All abbreviations and references for these sections are provided in the main EIS and EIS Appendix 10, respectively.

3.1 INTRODUCTION AND METHODOLOGY (SEE MAIN EIS)

3.2 AIR QUALITY (SEE APPENDIX 15)

3.3 AVIAN AND BAT SPECIES

3.3.1 Bat Populations and Roosting Habitat

3.3.1.1 Affected Environment

3.3.1.1.1 BAT ROOSTING HABITAT

Bats need roosts for resting during short-term periods of inactivity. Different species of bats have different roosting needs, and some species may prefer to roost in one type of structure during the day and a different type of structure at night. Some species have additional requirements for long-term roost sites, which can be either maternity roosts or hibernacula. Maternity roosts are used by gestating females and typically have specific temperature requirements that favor growth of newborns. Hibernacula are overwintering roosts and are generally larger and more specific than day or night roosts. This EIS assesses potential impacts to the known roosting features and hibernacula in and near the analysis area.

Caves and other lava features in and near the analysis area may provide suitable bat roosting habitat and have been known to concentrate bat activity during the fall swarming period (when bats congregate in large numbers to mate or orient young bats to migration routes or hibernacula). These features may also serve as hibernacula for hibernating cave species or provide suitable summer maternity or bachelor colony habitat (Frost et al. 1996). MVE assessed the potential for previously identified potential bat roosts to be used as maternity (summer), migratory stopover (spring and fall), or hibernacula (winter) sites (WEST 2021b). The assessment included four caves, four lava tubes, six lava vents, and a lava crater.

The lava vents visited during the bat roosting features assessment (WEST 2021b) had no noticeable aboveground features on the landscape and thus were unlikely to be used as bat features. Most of the lava tubes assessed had rocky outcrops or rock piles that also have low potential to be used for day roosting but could provide suitable night roosts. The lava crater may provide suitable habitat as a migratory stopover, and cracks and fissures may be suitable for summer maternity season use by *Myotis* species (WEST 2021b). None of the caves meet the quantitative criteria for disqualification as potential hibernacula or maternity roosts, though no bats or signs of bats (i.e., guano, staining, audible bat calls) were observed at any cave entrance. Kimama Wind Cave and Wilson Butte Cave contained signs of extensive human disturbance (such as trash, fire rings, graffiti) and would unlikely be important maternity, migration, or maternity roosts. Of the two unnamed caves, only one (the unnamed cave in the analysis area) may provide suitable migratory stopover habitat. Neither cave is likely to be an important maternity, migration, or maternity roost (WEST 2021b). Acoustic monitoring near both unnamed caves in July and August 2021 revealed relatively low bat use near these caves, confirming they are unlikely to be important roost sites. The single lava crater (Crater Butte) included in the assessment is north of Dietrich, Idaho, to the northwest of the analysis area and had the highest potential to be used as a roost site.

Although none of the potential bat roosting features included in the 2020 assessment are likely to be major roosting locations for resident or migratory bats, other suitable roosting habitat is likely present in the analysis area and may include structures, piles of lava rock, cracks and crevices in rock outcrops, caves, and trees. One U.S. Geological Survey (USGS) North American bat dataset (NABat) station (89781-NE; Figure 3.3-1) included in the 2021 acoustic monitoring surveys, which is located near a small lava crater that sits between two siting corridors, recorded far higher use (81.05 ± 14.65 bat passes per detector-night) than any other station monitored, and peaks in call activity shortly after sunset and before sunrise confirm this site is used for roosting.

Although not visited as part of the bat roosting feature assessment (WEST 2021b), there is a high concentration of volcanic features, such as lava tubes, vents, craters, and caves that provide roosting habitat for a variety of bat species, throughout the SFO planning area and at CRMO, which is less than 10 miles northeast of the siting corridors. Townsend's big-eared bat (*Corynorhinus townsendii*) is the most commonly recorded species at CRMO, and most (64%) known maternity roosts for the species in Idaho are within CRMO; western small-footed bat (*Myotis ciliolabrum*) is the second-most common bat in hibernacula at CRMO (Stefanic 2021). All but five of the bat species listed in Table 3.3-1 have been recorded in CRMO. One species, canyon bat (*Parastrellus hesperus*), is included on the list from CRMO, but occurrence is limited to an unconfirmed record from the Wapi lava flow. CRMO is within the range of the remaining four bat species without occurrence records (Stefanic 2021). Since CRMO is less than 10 miles from the siting corridors and contains extensive roosting habitat, and because it has recorded occurrences of many of the same species that were recorded in and near the analysis area, it is possible that bats roosting at the park may move between the analysis area and CRMO during foraging or seasonal migrations.

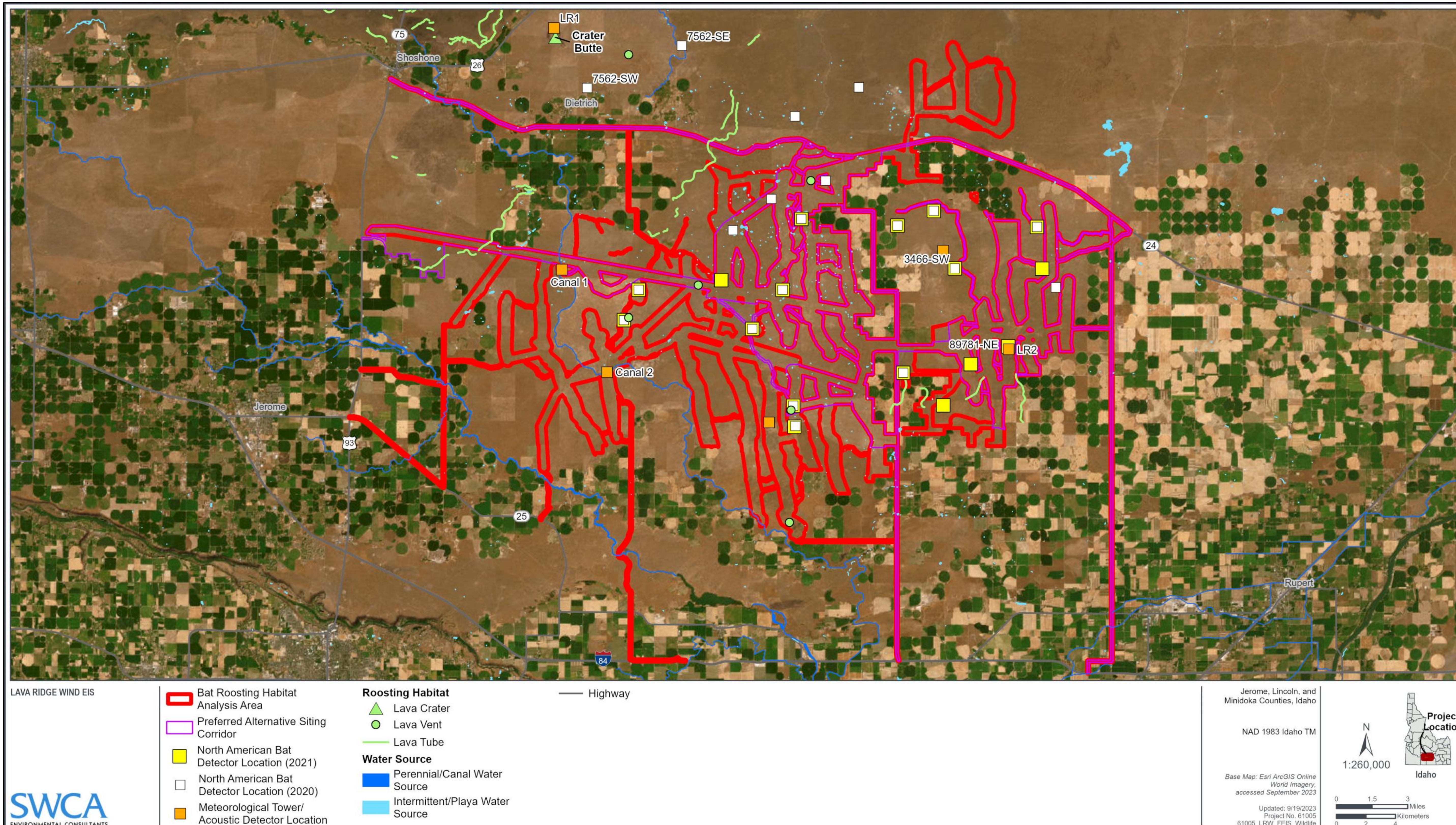

Figure 3.3-1. Bat roosting habitat analysis area.

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3.3.1.1.2 BAT POPULATIONS

The bat populations analysis area is the EPA North American Deserts Level I Ecoregion (Figure 3.3-2). Ecoregions provide natural and hierarchical classifications of spatial regions based on meaningful ecological characteristics, underlying ecological communities, and geographic space. Thus, they provide an ecological approach to capturing regional variation in bat occupancy (Udell et al. 2022). Ecoregions also provide useful spatial units over which to model changes in population, as opposed to modeling changes in population as constant across a species range. Data on bat fatality rates and installed wind capacity are also available at the ecoregion level, which allows for a more informed estimation of the bat fatality rate that could be expected under the action alternatives, and the relative contribution of those fatalities to the overall impact on regional bat populations.

Seventeen bat species have been documented in Idaho (see Table 3.3-1), and all have the potential to occur in the analysis area based on known distributions and presence of suitable habitat. To document seasonal, spatial, and temporal variation in bat activity and to evaluate species composition, WEST monitored bat activity in and near the analysis area at two long-term acoustic stations between April 13 and November 1, 2020 (737 detector nights) and at 21 stations deployed for NABat surveys between July 16 and 21, 2020 (91 detector nights) (see Figure 3.3-1) (WEST 2021a). At the two long-term acoustic stations, microphones were placed at ground stations (approximately 5 feet aboveground) and at raised stations (approximately 158 feet aboveground) within the rotor-swept height (RSH),[1] which is defined as 130 to 790 feet aboveground. During the second year of surveys, data were collected from 17 NABat stations between July 7 and 20, and again between August 18 and 29 (312 detector nights). Data were collected during the same time periods from four acoustic monitoring stations installed for the project-specific surveys: two near irrigation canals and two near caves that may be used for roosting. Microphones were placed approximately 10 feet aboveground on all four stations (WEST 2022a). Acoustic monitoring detected calls from 13 bat species (identified in Table 3.3-1 as *detected during survey*), including one species not expected to occur in Idaho (WEST 2021a, 2022a).

Table 3.3-1. Idaho Bat Species and Potential to Occur in the Siting Corridors

Common Name	Scientific Name	Status*	Potential for Occurrence	Season of Use (peak in bold font)	Call Frequency (Kilohertz)
Big brown bat	*Eptesicus fuscus*	S SGIN	Detected during survey	Summer, **fall**	15–30
Big free-tailed bat†	*Nyctinomops macrotis*	None	Detected during survey	Accidental	< 15
California bat	*Myotis californicus*	None	Detected during survey	Summer	> 30
Canyon bat	*Parastrellus hesperus*	S SGIN	Detected during survey	Fall	> 30
Fringed bat	*Myotis thysanodes*	SGIN	Detected during survey	Fall	15–30
Hoary bat	*Lasiurus cinereus*	S SGCN	Detected during survey	Summer, **fall**	15–30
Little brown bat‡	*Myotis lucifugus*	S SGCN	Detected during survey	Summer, **fall**	> 30

[1] The RSH of a wind turbine is determined by the length of the turbine blades and the height of the turbine rotor hub. The RSH for the smallest proposed turbine model is 130 to 390 feet aboveground, and the RSH for the largest commercially available turbine models is 180 to 790 feet. Therefore, a combined RSH of 130 to 790 feet was used for purposes of analysis in this EIS.

Common Name	Scientific Name	Status*	Potential for Occurrence	Season of Use (peak in bold font)	Call Frequency (Kilohertz)
Long-legged bat	*Myotis volans*	S SGIN	Detected during survey	Summer	> 30
Mexican free-tailed bat	*Tadarida brasiliensis*	None	May occur	Unknown	
Pallid bat	*Antrozous pallidus*	S SGIN	Detected during survey	Fall	15–30
Silver-haired bat	*Lasionycteris noctivagans*	S SGCN	Detected during survey	Summer, **fall**	15–30
Spotted bat	*Euderma maculatum*	SGIN	May occur	Unknown	< 15
Townsend's big-eared bat	*Corynorhinus townsendii*	S SGCN	Detected during survey	Summer, fall	15–30
Western long-eared bat	*Myotis evotis*	S	May occur	Unknown	> 30
Western red bat	*Lasiurus blossevillii*	None	May occur	Unknown	
Western small-footed bat	*Myotis ciliolabrum*	S	Detected during survey	Summer, **fall**	> 30
Yuma bat	*Myotis yumanensis*	S SGCN	Detected during survey	Summer, fall	> 30

Sources: Stefanic (2021); WEST (2021a, 2022a).

* S = BLM SFO special-status species; SGCN = species of greatest conservation need; SGIN = species of greatest information need.

† This species was not documented in Idaho prior to the 2020 acoustic monitoring surveys (WEST 2021a). It is not listed as a BLM special-status species in Idaho, but it is listed as a BLM special-status species in Utah.

‡ The USFWS is currently conducting a status review for this species, and it could become listed under the ESA in the near future.

Bat Use in the Siting Corridors

Hoary bat (*Lasiurus cinereus*) accounted for most of the bat activity (for which a species could be identified) recorded during the 2020 bat acoustic monitoring surveys (WEST 2021a), followed by silver-haired bat (*Lasionycteris noctivagans*) and western small-footed bat. Townsend's big-eared bat, little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), Yuma bat (*Myotis yumanensis*), and fringed bat (*Myotis thysanodes*) were also observed. Most bat passes could not be identified to species level, and most bat activity was recorded as unidentified *Myotis* species, recorded at the ground stations (WEST 2021a). At the two long-term acoustic stations, overall activity was higher at the ground stations than at the raised stations, and although species composition was similar, bats with low-frequency calls (between 15 and 30 kilohertz, such as big brown bat, fringed bat, hoary bat, silver-haired bat, and Townsend's big-eared bat) made up a greater proportion of detections at the raised stations than at the ground stations. Virtually all unidentified *Myotis* species activity was recorded at the ground stations (WEST 2021a).

Bat activity varied substantially among seasons, with low activity in the spring (April 13–May 14) and summer (May 15–August 15) and high activity in the fall (August 16–November 1). Overall, activity by bats with high-frequency calls (i.e., most *Myotis* species) was higher in the summer than in the fall, whereas activity by bats with low-frequency calls was highest in the fall. Hoary bat activity peaked in late August, silver-haired bats were detected from spring through summer and were the last species identified in the area in October, and Townsend's big-eared bats were detected sporadically throughout the monitoring period. Three bat species were recorded only during the fall migratory season: little brown bat, fringed bat, and big free-tailed bat.

Western small-footed bat was the most recorded bat species during the 2021 acoustic monitoring surveys (73.7% of passes at project acoustic monitoring stations and 1.4% of passes at NABat stations), though this is likely due to improved ability to differentiate between calls of *Myotis* species (WEST 2022a), and it is possible that this species was also the most abundant during the 2020 bat acoustic monitoring surveys given that most calls recorded in 2020 were labeled as unidentified *Myotis*. Most (80%) of the western small-footed bat activity was recorded at the NABat station 89781-NE (near the lava crater roost site). Hoary bat and silver-haired bat detections remained common during the 2021 surveys, and all of the species recorded in 2020 were also detected in 2021 with the exception of big free-tailed bat. Four new species were detected in 2021 that were not recorded in 2020: California bat (*Myotis californicus*), canyon bat, long-legged bat (*Myotis volans*), and pallid bat (*Antrozous pallidus*).

Since water attracts insects, bats may locally concentrate around water features, wetlands, or streams while foraging (Adams and Hayes 2021; Grindal et al. 1999; Hayes and Wiles 2013). In addition, most of the bat species that may occur in the siting corridors drink from still, flat water surfaces while in flight and tend to avoid flowing water, which disrupts echolocation (Greif and Siemers 2010). The 2020 bat acoustic monitoring surveys identified more bat passes and higher species diversity at survey stations with the largest and highest quality water resources (WEST 2021a). Most of the bat detections occurred at the two NABat stations along an irrigation channel, and the next acoustic monitoring station with the highest activity (3466-SW) is adjacent to a stock pond. All three of these NABat stations are approximately 2 miles outside the analysis area (see Figure 3.3-1). NABat stations adjacent to stagnant or algae-covered stock ponds recorded less activity. During the second year of project acoustic monitoring surveys, much higher bat activity was recorded at the acoustic monitoring stations installed near the irrigation canals in the siting corridors than at monitoring stations installed near cave features (see Figure 3.3-1), confirming that concentrated foraging activity occurs along the canals (WEST 2022a). Overall, the data from the acoustic monitoring surveys indicate that bats are attracted to prominent flat water and rock features within the siting corridors, which is expected given the limited number of water resources within the siting corridors (WEST 2022a).

Most of the lakes, ponds, and reservoirs in and near the analysis area are intermittent and unlikely to provide suitable drinking or foraging resources year-round. However, these water features could provide drinking or foraging resources seasonally or in years when they are inundated. Water in the 173 acres of stock ponds can be highly ephemeral and may be of low quality (stagnant or covered with algae), though larger stock ponds may contain water more regularly and provide more consistent foraging and drinking opportunities for bats. Water troughs for livestock are also present throughout the active rangelands in the siting corridors and may provide drinking water in areas that are otherwise dry. Year-round water resources are limited to 47 acres of canal surface (Figure 3.3-1). Overall, the canals likely provide the highest quality and most consistent drinking and foraging resources in the siting corridors. Canals are largely located in and adjacent to the western and southern portions of the analysis area. Other water sources are scattered through the middle of the analysis area, with significant surface water features associated with Star Lake (outside but adjacent to the analysis area) and Wilson Lake Reservoir (outside and south of the analysis area). Since the highest number of bat detections occurred at two detectors adjacent to an irrigation channel and a stock pond, it is likely that these water resources are important habitat components for bats in the analysis area.

Although water features may concentrate bat activity, bats travel from day roosts to foraging areas each night over distances of up to 12 miles (and up to 26 miles in rare instances [Siders et al. 1999]), and some species may make several round-trip flights in a single night. Collisions may occur with turbines located anywhere in their nightly flight path, and postconstruction monitoring usually reveals consistent fatality rates at all turbines across a facility, even when features that concentrate bat activity are present (Hein and Schirmacher 2016). Migratory tree bat fatalities are consistently higher during the fall migratory period (WEST 2021c), suggesting their risk of collision with turbines is even less influenced by the proximity of turbines to foraging resources. High bat use has been documented at the irrigation canals toward the western limits of the siting corridors and at presumed roosting features toward the far eastern limits of the siting corridors (WEST 2022a), which are separated by a distance of less than 15 miles, suggesting that bats may cross the siting corridors multiple times each night when travelling between roost sites and foraging areas. Although other potential foraging routes have not been identified, bats using the lava crater roost site and other roosting features in or near the siting corridors may be exposed to turbines and other project infrastructure during foraging flights.

Characterizing the abundance of individual bat species in the siting corridors is not possible with acoustic monitoring data alone because individual bats may be recorded passing the same detector multiple times. Due to the general lack of detailed long-term studies on bats, it is also difficult to determine how bat abundance and use in the siting corridors compare to other locations within the analysis area. However, the recent publication of the first results of the North American Bat Monitoring Program have begun to shed some light on spatial variations in bat occupancy (Udell et al. 2022). Results are only available for five of the bat species listed in Table 3.3-1, but summer occupancy maps for all five of these species clearly show that bat occupancy in the Snake River Plain is substantially lower than surrounding areas. This is consistent with the low bat activity observed during summer acoustic monitoring surveys (WEST 2021a, 2022a). Winter abundance maps are not yet available, and occupancy during migration is not included in the study. The pronounced peak in bat activity during the fall migratory season recorded during project acoustic monitoring surveys indicates that bats have the potential to pass through the siting corridors in large numbers, even if little bat use is occurring during the summer and winter (when bats would be hibernating).

Figure 3.3-2. Bat populations analysis area.

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Species Analyzed in Detail

Information regarding bat population size, current population trends, and potential growth rates by species are needed to make precise determinations of the potential population-level effects to bat species from collisions with turbines (Frick et al. 2017). This section provides a summary of what is known about this information. However, due to the wide-ranging and cryptic nature of bats, basic demographic data are lacking for most species, especially migratory tree bats, which are among the least studied (Frick et al. 2017; Kunz et al. 2007). Despite the lack of detailed species-specific data, bats in general are long-lived species with low reproductive rates, and high adult survivorship is necessary to avoid population declines (Allison and Butryn 2020; Frick et al. 2017; Hein and Schirmacher 2016). Bats rarely collide with stationary structures such as buildings and met towers, and fatalities from turbine collisions represent an additive source of mortality that North American bat populations were not subjected to prior to the expansion of wind energy in the United States and Canada (Allison and Butryn 2020; Hein and Schirmacher 2016; Zimmerling and Francis 2016). Thus, even though there are substantial limitations to quantitatively assessing impacts to bat populations, given the sensitivity of bat populations to increased mortality and the large number of fatalities that have been observed at existing wind energy facilities. However, it is widely accepted that turbine collisions have the potential to cause major declines in the populations of some bat species (AWWI 2018; Frick et al. 2017; Hein and Schirmacher 2016; Hein et al. 2021; Zimmerling and Francis 2016).Species with small, declining populations may be vulnerable to small increases in mortality as a result of collisions with turbines. Species with larger, more stable populations may also be vulnerable to population declines if very high fatality rates from turbine collisions are sustained over a long time period. Each of the bat species with the potential to occur in the siting corridors (see Table 3.3-1) was evaluated for its likelihood of colliding with turbines and the potential for those fatalities to lead to population-level effects. Twelve of these species were determined to have a low likelihood of population-level effects. Though effects to these 12 species may occur (as analyzed and described in Table App3-2 in EIS Appendix 3), none of these species would be expected to experience a readily detectable population decline in the analysis area. Thus, to comply with 40 CFR 1502.2(b), this EIS "has only [a] brief discussion of other than significant issues" and focuses on species with a moderate to high likelihood of population-level effects from the project. The five species (big brown bat, little brown bat, western small-footed bat, hoary bat, and silver-haired bat) that were determined to have a moderate to high potential for population-level effects are described in detail below. Cave-hibernating bats are addressed separately from migratory tree bats because the risk factors for each group are notably different.

Cave-Hibernating Bats

Cave-hibernating bats such as big brown bat, little brown bat, and western small-footed bat respond to cooler temperatures and reduced prey availability in winter by retreating to hibernacula with low but stable temperatures. Although caves in the siting corridors do not appear to be suitable for use as hibernacula (WEST 2021c), other lava features and rock piles or outcrops in the siting corridors could be used as hibernacula by small numbers of bats. These species enter a state of torpor, or reduced metabolic activity, while hibernating and are generally inactive during the winter.

Although cave-hibernating bats have a lower likelihood of turbine collisions and are not recorded in large numbers as fatalities at existing U.S. wind energy facilities (Allison and Butryn 2020), many of these species have recently experienced major population declines due to the spread of white nose syndrome (WNS), a disease caused by the fungus *Pseudogymnoascus destructans*. Thus, even though these species may have a lower likelihood of colliding with turbines, even a small increase in fatalities could have population-level impacts for those species whose populations have already been significantly reduced by WNS (Zimmerling and Francis 2016). The response of bats to infection by the *Pseudogymnoascus destructans* fungus varies between species and between regions; some bats that test positive for the fungus do not develop WNS (e.g., Townsend's big-eared bat) (White-nose Syndrome Response Team 2022a), and some bat populations have remained relatively stable despite widespread WNS infections (e.g., big brown bat).

BIG BROWN BAT

Big brown bats rarely travel more than 56 miles from their winter hibernacula, which can be located in buildings, mines, rock crevices, and caves. During the summer, day and night roosting occurs in a variety of settings, including buildings, bridges, cliffs, caves, mines, and trees. Big brown bats roost colonially or in small groups. Foraging occurs in open habitats and forest edges, often near open water, though big brown bats forage over the tops of trees more frequently than other bats. Big brown bats often begin foraging in large circles high above the ground, but most foraging activity occurs within 50 feet of the ground; individuals may travel up to 6 miles from their roosts to forage (Hayes and Wiles 2013).

Big brown bats were affected by the spread of WNS but fared better than other species that were devastated by the fungus; in some areas, the population appears to have increased despite impacts from WNS (Kopsco and Hall 2014). WNS has affected hibernacula across 32% of the big brown bat's range, and winter counts at sites where WNS has been detected have recovered from a 65% decrease at the peak of the epidemic to a 54% decrease in recent years (Cheng et al. 2021).

The big brown bat is a BLM special-status species for the SFO (see Table 3.3-1), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the Endangered Species Act (ESA). Although big brown bats appear are relatively common across their geographic range, reliable estimates of population size and trend are lacking (Allison 2018; Hayes and Wiles 2013; Schmidly and Bradley 2016).

Three big brown bat passes were recorded at the LR1 ground-level detector (see Figure 3.3-1) during the first year of acoustic monitoring surveys; one pass was detected in early July and the other two passes were detected in late August and early September (WEST 2021a). During the second year of acoustic monitoring, several big brown bat passes were recorded at the irrigation canals and at NABat stations in and adjacent to the siting corridors; use was similar in summer and fall (WEST 2022a).

LITTLE BROWN BAT

Little brown bats may engage in substantial regional migrations, travelling hundreds of miles to reach summer maternity roosts and foraging habitat. In addition to caves, lava tubes and mines are used for hibernacula; the species hibernates in small groups in the western United States but is highly colonial in the east. Like big brown bats, little brown bat day and night roosts can include trees, humanmade structures, and various rock features. Males tend to roost singly or in small groups, whereas females gather in large maternity colonies. Foraging is often concentrated over open water but also occurs in forests, forest edges, and other cover types (Hayes and Wiles 2013). Most foraging activity occurs less than 16 feet above the ground and within 5 miles of roost sites, though some individuals may forage up to 9 miles from their roost site (Falxa 2005).

The population size and trend for the little brown bat were not well studied prior to the spread of WNS, but the species was considered stable and was one of the most common and widespread bat species in North America (Alaska Department of Fish and Game 2022; Committee on the Status of Endangered Wildlife in Canada [COSEWIC] 2012; Hayes and Wiles 2013). Since WNS emerged in the northeastern United States in 2006, it has led to a 90% decline in winter counts of little brown bats from colonies where the fungus has been reported. Modeling conducted in 2010 indicated that there was a 99% chance the little brown bat would be extirpated from the northeastern United States by 2026 (Frick et al. 2010). However, the little brown bat has a much wider range than most of the other bat species that have been heavily impacted by WNS, and as of 2019, WNS had not been confirmed at little brown bat hibernacula west of the Dakotas (Cheng et al. 2021). Populations in the West and Pacific Northwest have remained relatively stable and large, though concerns remain that WNS will eventually spread to, and decimate, these populations (COSEWIC 2012; Hayes and Wiles 2013; Udell et al. 2022). Thus, the overall threat to the species from WNS is still high (Cheng et al. 2021). Little brown bats from multiple hibernacula that may be hundreds of miles apart often swarm together at summer roost sites immediately before migrating to their winter hibernacula, which is thought to be an important mechanism of spread for WNS (Neubam and Siemers 2021). Thus, dispersed hibernacula sites in the western United States may not help protect the species from further spread of WNS (COSEWIC 2012).

The little brown bat is an Idaho SGCN and a BLM special-status species for the SFO (see Table 3.3-1), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the ESA. The USFWS has already initiated a range-wide status review for the little brown bat (USFWS 2022), and the species could become listed under the ESA in the near future.

All five little brown bat passes recorded during the first year of acoustic monitoring surveys occurred at the LR2 ground-level detector near Kimama Cave (see Figure 3.3-1) during the 2-week period between September 10 and September 23 (WEST 2021a). However, most *Myotis* calls could not be reasonably identified to the species level during the first year of acoustic monitoring surveys. Unidentified *Myotis* species accounted for most of the bat activity recorded during the first year of surveys and was recorded in every season but peaked between early August and mid-September (WEST 2021a). Most unidentified *Myotis* activity was recorded at the ground-level detectors (WEST 2021a). Little brown bats were recorded much more frequently during the second year of project acoustic monitoring surveys. The species accounted for nearly 5% of all calls for which a species could be identified at the NABat stations, and 0.5% of all calls for which a species could be identified at the project acoustic monitoring stations, though this could be due in part to improved ability to differentiate *Myotis* calls to the species level (WEST 2022a). Little brown bat activity during the 2021 surveys was higher in fall than summer and occurred almost entirely at the canal stations.

WESTERN SMALL-FOOTED BAT

Western small-footed bats do not travel far from their winter hibernacula, though movements of up to 136 miles have been documented (Cannings and Hammerson 2015; Hayes and Wiles 2013). The species hibernates alone or in small groups in rock crevices of caves and mines, and rarely, in buildings (Hayes and Wiles 2013); a lava tube in southern Idaho is the largest known hibernacula in the western United States (IDFG 2017). Western small-footed bats use crevices in rock faces and cliffs, boulder piles, exfoliating tree bark, buildings, caves, mines, and bridges as day and maternity roosts. Some day roosts are also used as night roosts, but caves, mine entrances, buildings, and bridges are most common (Hayes and Wiles 2013). This bat forages over water, along forest edges, near rock bluffs, or low to the ground (3 feet) over desert chaparral. Western small-footed bats usually forage within 1 to 2 miles of roost sites but up to 6.5 miles in some instances (Cannings and Hammerson 2015).

Like most bats, precise estimates of the western small-footed bat population size and trend are not available, though the species is considered common in the west, and the population trend over the last 10 years has most likely been stable or slowly declining (Hammerson 2015; Hayes and Wiles 2013). The fungus that causes WNS has been detected in the species, but characteristic signs of the disease have not been noted (White-nose Syndrome Response Team 2022a). Although this could be related to their tendency to roost and hibernate in small groups, large colonies (close to 100 individuals) have been documented in southern Idaho caves where they are found with even larger numbers of Townsend's big-eared bats (Whiting et al. 2018). It is unknown how western small-footed bat populations would be impacted if WNS spreads to these hibernacula; it is possible the species may experience declines from WNS in the future (see EIS Section 3.3.1.1.3 [Existing and Future Trends and Actions]).

The western small-footed bat is a BLM special-status species for the SFO (see Table 3.3-1), which indicates management intervention will likely be necessary to prevent long-term declines in the species and to prevent a trend toward federal listing under the ESA.

The western small-footed bat was recorded during both years of acoustic monitoring surveys and was the most active species at the lava crater roost site (WEST 2021a, 2022a), which accounted for approximately 80% of western small-footed activity recorded in 2021. Although very few western small-footed bat passes were recorded during the first year of surveys, the species accounted for nearly 74% of the passes that could be identified to the species level during the second year. This is likely due to improvements in the ability to differentiate *Myotis* calls to the species level during the second year (WEST 2022a), and the species likely accounts for most of the activity recorded during summer in the first year of surveys (which was predominantly unidentified *Myotis* species).

Migratory Tree Bats

Migratory tree bats such as hoary bat and silver-haired bat roost in the foliage of trees and engage in long-distance seasonal migrations. Rock crevices, caves, lava features, and humanmade structures may also be used for roosting. These species tend to have large ranges and migrate south in the winter to warmer areas with more prey availability. Although they may enter torpor for varying lengths during cold periods, they remain relatively active through the winter and return north in the spring and early summer (Allison 2018). Some silver-haired bats may hibernate within the northern portion of their range (Hayes and Wiles 2013). Both species prefer forested habitats but can be found foraging in a variety of open habitats, though most records from shrub-steppe appear to be migrating individuals (Arizona Game and Fish Department [AGFD] 2004; Hayes and Wiles 2013; Washington Department of Fish and Wildlife 2022a, 2022b). Both species are most active shortly after sunset but may forage throughout the night; foraging typically occurs within 2 to 12 miles of roosts, but foraging flights as long as 32 miles have been recorded (AGFD 2004; Maxell 2015; Texas Parks and Wildlife 2022).

Postconstruction monitoring at existing U.S. wind facilities indicates that migratory tree bats account for most (72%) of the bat fatalities from collisions with turbines (AWWI 2018; Peters et al. 2020). The migratory behavior of these species (e.g., flight paths, flight height, migratory stopover habitat) are not well understood, which makes it difficult to determine the specific attributes that lead to the increased collision risk for these species (Hein and Schirmacher 2016; Peters et al. 2020). However, in general, it is expected that collision risk during migration to and from breeding grounds is higher for migratory tree bats because they must fly more frequently and over greater distances than cave-hibernating bats (Cryan and Barclay 2009). Recent research indicates that migratory bats like the hoary bat and silver-haired bat do not migrate evenly across the landscape, but use discrete migratory corridors, which can lead to geographic variation in the likelihood of colliding with turbines (Baerwald and Barclay 2009; Baerwald et al. 2014). These studies found evidence that hoary bat and silver-haired bat migratory routes in southern Canada are concentrated along rocky foothills on the eastern slope of the Rocky Mountains and less prevalent in the open prairies (Baerwald et al. 2014), though it is unknown if this pattern holds true further south in the United States. The expansion of wind energy in the United States and Canada is considered a major threat to both species (Bat Conservation International [BCI] 2021; BLM 2005).

Both the hoary bat and the silver-haired bat are BLM special-status species for the SFO and are Idaho SGCNs (see Table 3.3-1), which indicate management intervention will likely be necessary to prevent long-term declines in these species and to prevent a trend toward federal listing under the ESA. The USFWS plans to review the hoary bat for potential ESA listing in fiscal year 2027 (USFWS 2023).

HOARY BAT

As with most bat species, detailed demographic data for hoary bats are lacking. The best available estimate of the hoary bat population size, which was based on expert elicitation rather than empirical data, is approximately 2.25 million (Frick et al. 2017). Genetic studies of hoary bats indicate the species has a large, well-connected population with an effective size[2] in the hundreds of thousands to millions (Cornman et al. 2021; Hein et al. 2021). Unlike other bats, species in the genus *Lasiurus* may give birth to litters of up to four or five young (as opposed to one or two for other species), though the average for hoary bat is two young per litter (AGFD 2004, 2011). Whether this translates to a higher growth rate for *Lasiurus* species depends on whether juvenile mortality is also higher among these species, which is not well studied.

The best available estimate of the population growth rate for hoary bats was also based on expert elicitation (Frick et al. 2017) and is 1.5%, which is slightly higher than the average reported in the literature for other species (0.25%), though experts suggested the growth rate for the species could be as high as 16% to 18%. Empirical evidence of the hoary bat population trend since the introduction of wind energy is also lacking, and attempts to model the species trend or infer trends from genetic studies have produced mixed results. Studies have found no evidence of recent population declines (Cornman et al. 2021; Green et al. 2021; Korstian et al. 2015; Sovic et al. 2016), though all have noted limitations on their results, particularly because the well-mixed nature of the population may help maintain genetic diversity (and thus effective population size) despite overall population declines. Some studies have found evidence of regional hoary bat population declines (Rodhouse et al. 2019), and a study of fatalities recorded at 594 turbines in Ontario, Canada, over 7 years reported large declines (> 68%) in hoary bat carcass detections that could not be attributed to avoidance alone (Davy et al. 2020). Modeling has shown that the hoary bat fatality rates documented at existing U.S. wind energy facilities are high enough to cause severe population declines and increase the risk of extinction, even if the current population was much larger than estimated (Frick et al. 2017; Friedenberg and Frick 2021). At the most widely accepted estimate of 2.5 million bats, the hoary bat population would be expected to decline by as much as 90% over the next 50 years as a result of fatalities at wind energy facilities, and could be reduced by half as soon as 2028. It is unlikely that hoary bats would be capable of increasing their population's growth rate enough to prevent population declines (Frick et al. 2017). However, these findings did not take into account the effect of minimization measures (such as curtailment or acoustic deterrents) that could be implemented to reduce bat fatalities. Building on this work, additional modeling revealed that hoary bat fatality rates at wind energy facilities would need to be reduced by 78% to lower the probability of extinction for the species by 2050 to less than 1% (Weaver et al. 2020).

Hoary bats accounted for most of the bat activity recorded during the first year of acoustic monitoring surveys for which a species could be identified (WEST 2021a), and the results showed virtually no difference between hoary bat activity at ground-level detectors and raised detectors within the RSH. Hoary bats were detected from late April through mid-October but showed a pronounced peak in activity in mid-August, which corresponds to the fall migratory period for the species (WEST 2021a). Hoary bats were the second-most recorded bat species during the 2021 surveys, accounting for 2.3% of all calls for which a species could be identified at the NABat stations and 21.3% of all calls for which a species could be identified at the project acoustic monitoring stations (WEST 2022a). Hoary bat activity was much higher in August than in July and was recorded at all NABat and project acoustic monitoring stations, but was higher at the canal stations and NABat stations near stock ponds (WEST 2022a).

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[2] Effective population size (N_e) is a measure of genetic diversity and is, on average, 11% of the actual (or census) population size, though it can be as little as 5% of the actual population or as much as 80%. N_e generally reflects attributes of the population from the past rather than the present (Hein et al. 2021).

SILVER-HAIRED BAT

Detailed demographic information for the silver-haired bat is also lacking, but this species was once considered to be one of the most abundant bats in North America, especially in forested habitats, though there appears to be considerable variation within its range, and it has never been common in some areas (Kunz 1982; Texas Parks and Wildlife 2022).

Silver-haired bat activity recorded during the first year of acoustic monitoring surveys (WEST 2021a) was the second highest of all bats but was considerably lower than hoary bat activity (21 passes in comparison to 153 passes). As with hoary bat, activity at ground-level and raised detectors within the RSH was similar. Silver-haired bats were recorded from early May through late October and were detected later in the fall than any other species. Silver-haired bat activity peaked in early September during the fall migratory period for the species (WEST 2021a). Silver-haired bats were the third-most recorded species during the second year of project acoustic monitoring accounting for 1.8% of all calls for which a species could be identified at the NABat stations and 0.3% of all calls for which a species could be identified at the project acoustic monitoring stations (WEST 2022a). Use was slightly higher at the canal stations as compared to the cave stations, but it was not higher at NABat stations near stock ponds.

3.3.2 Avian Populations

3.3.2.1 Affected Environment

The analysis area (BCR 9) (Figure 3.3-3) is characterized by high mountain ranges dominated by pinyon-juniper woodlands and ponderosa pine (*Pinus ponderosa*) forests, and separated by broad, low xeric valleys dominated by sagebrush and other shrub communities. Large lowland wetlands in this region provide important habitat for shorebirds and waterfowl; most of the California gull (*Larus californicus*) population nests in lakes and marshes scattered throughout this region. Sagebrush-dependent species such as greater sage-grouse, sagebrush sparrow (*Artemisiospiza nevadensis*), and sage thrasher (*Oreoscoptes montanus*) are the conservation priority in lowland habitats (North American Bird Conservation Initiative 2021).

There are no Important Bird Areas (IBAs)[3] designated in the siting corridors. The nearest IBA is the CRMO IBA, which is approximately 10 miles northeast of the nearest siting corridor. The CRMO is a globally important IBA that is used by migratory birds, including raptors, and known for supporting a large population of nesting Brewer's sparrows (*Spizella breweri*) (National Audubon Society 2023). The Morley Nelson Snake River Birds of Prey National Conservation Area, which is known for supporting the greatest concentration of nesting raptors in North America, is approximately 52 miles west of the nearest siting corridor (BLM 2012). However, the large rocky canyons and high density of small mammal prey that attract large numbers of raptors to the national conservation area are not present in the siting corridors, nor are there any mountain ridges that would provide updrafts for migrating raptors. With the exception of limited permanent water resources (namely canals), the siting corridors do not contain habitats that would concentrate migrating birds. In particularly wet years, vernal pools and playas in the siting corridors may fill and temporarily provide habitat for shorebirds and waterfowl. Outside the siting corridors, a small number of larger waterbodies (such as Wilson Lake Reservoir) are present and may serve as migratory stopover habitat for several migratory bird species. The analysis area is in the Pacific Flyway for migratory birds; however, migratory routes in this flyway are concentrated along the Pacific coast and, to a lesser extent, the western slope of the Rocky Mountains. Migratory movements within

[3] IBAs are identified by BirdLife International using an internationally agreed upon set of criteria as being important for the conservation of bird populations; IBAs are designated at the state, continental, and global level (BirdLife International 2022).

Idaho are primarily east to west and concentrated along the Snake River, Salmon River, and Pend Oreille River corridors (USFWS n.d.).

The flight altitude of migrating birds varies substantially based on species, time of day, local topography, and weather (Kerlinger 1983). Recent research indicates that migratory movements in the western United States primarily occur at higher altitudes, with an average height of 2,600 feet aboveground and some flights occurring as high as 5,000 to 6,000 feet aboveground (Axelson 2021; Sjoberg 2021). It is rare for migrating passerines to collide with wind turbines. The few instances where multi-bird fatality events have been recorded (> 3 birds killed in one night at one structure) occurred during inclement weather (when migrating birds may be forced to lower altitudes) and at structures near sources of steady illumination (not structures with FAA-standard blinking red aviation hazard lighting. Fatality rates for nighttime migrants show a gradient with fatalities increasing from western to eastern North America (Kerlinger et al. 2010). Turbines have increased in size since this study was conducted, but the largest turbines proposed for the Lava Ridge Wind Project are still at least 250 feet shorter than the tall communication towers where large numbers of nighttime migrant fatalities have been recorded (Kerlinger et al. 2010).

As required by a 1988 amendment to the Fish and Wildlife Conservation Act, the USFWS identifies species, subspecies, and populations of all migratory non-game birds that, without additional conservation action, are likely to become candidates for listing under the ESA. These efforts are summarized in *The Birds of Conservation Concern 2021* (USFWS 2021), which identifies the species of highest conservation priority at both the continental scale and by BCR. Most bird species in the United States, with the exception of nonnative species such as the house sparrow (*Passer domesticus*) and European starling (*Sturnus vulgaris*), are protected by the Migratory Bird Treaty Act (MBTA) (16 USC 703–712). The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the USFWS. The responsibility of federal agencies to promote the conservation of migratory bird populations is established in EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). In compliance with EO 13186, the BLM and USFWS implemented a memorandum of understanding (MOU) to promote the conservation of migratory birds in April 2010, which was extended for 5 years on February 15, 2022 (BLM and USFWS 2022). The MOU provides specific direction on evaluating impacts to migratory bird populations in NEPA documents and developing conservation measures to prevent declines in avian populations.

For this analysis, special-status avian species are USFWS birds of conservation concern (BCCs) (USFWS 2021), BLM special-status species (BLM 2022), and IDFG species of greatest conservation need (SGCNs) (IDFG 2017, 2023).

Type 1 BLM special-status species include federally listed threatened and endangered species, and Type 2 BLM special-status species include state director–designated sensitive species, species proposed for listing under the ESA, and ESA candidate species. BLM special-status species require special management consideration to avoid potential future listing under the ESA (BLM 2022). BLM Manual 6840 instructs all offices to manage BLM special-status species and their habitats to minimize or eliminate threats affecting the status of the species or to improve the condition of the species' habitat (BLM 2008). As stated in the migratory bird MOU (BLM and USFWS 2022), at the project level, the BLM shall implement approaches to lessen the take of migratory birds where take reasonably attributable to agency actions may have a measurable negative effect on migratory bird populations, focusing first on species of concern.

As part of the *Idaho State Wildlife Action Plan* (IDFG 2017), IDFG identified SGCNs, which are species or habitats native to Idaho that are experiencing known threats and that, without intervention, are likely to continue to decline or to become increasingly vulnerable. IDFG is currently (2023) updating the state wildlife action plan; a draft of the updated plan was published in 2023 (IDFG 2023) but has not been finalized. The 2023 plan includes two categories of species: 1) SGCNs, which are species known to be experiencing declines or are at risk due to various stressors or emerging issues, and 2) species of greatest information need (SGINs), which are species potentially at risk but for which current scientific knowledge and expert understanding are lacking (IDFG 2023).

3.3.2.1.1 AVIAN USE IN THE SITING CORRIDORS

Resident birds (species that use the siting corridors year-round) and migrating birds (species that only use the siting corridors during a portion of the year) may use the siting corridors for breeding, nesting, foraging, hunting, roosting, and sheltering. The shrublands, rangelands, agricultural areas, and rocky outcrops in the siting corridors provide habitat, nesting and foraging areas, and migratory stopover areas for a variety of raptors and other migratory bird species. In all, 67 bird species were recorded during project avian use surveys (WEST 2021a, 2023); an additional 12 bird species have been identified within 4 miles of the siting corridors (IDFG 2020).

MVE conducted avian surveys to characterize species composition and patterns of use in and near the siting corridors (WEST 2021a, 2023) in accordance with USFWS (2012). Surveys were conducted on-site, once per month during daylight hours, between April 3, 2020, and April 17, 2022. The 2020 avian use survey area (Figure 3.3-4) was based on an earlier iteration of the proposed siting corridors and was adjusted during the second year of surveys to reflect the updated siting corridors. Therefore, observations reported across all avian point count locations from the 2020 survey year include observations recorded outside the siting corridors proposed in this EIS. Of the 90 avian point count locations from the 2020 survey year, 46 are in the Alternative B siting corridors.[4]

[4] Though the first year of avian surveys do not cover 30% of the “project area” as suggested in USFWS (2013) guidelines, the point count locations that fall outside the current siting corridors are within a few miles of the siting corridors in similar habitats.

Figure 3.3-3. Avian populations analysis area: Bird Conservation Region 9.

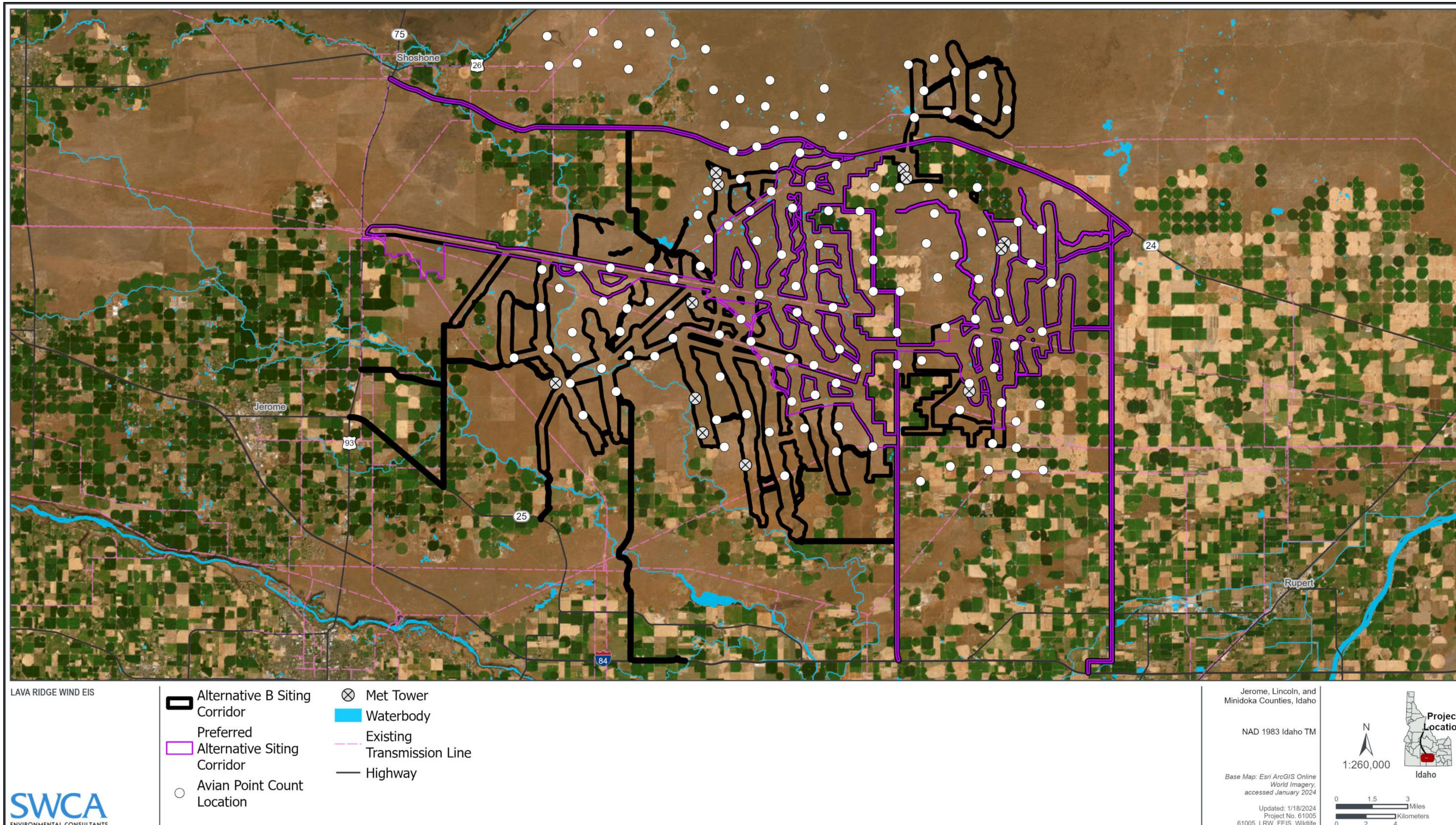

Figure 3.3-4. Avian use survey point count locations.

The most abundant small bird species recorded during the first year of avian use surveys were horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), and Brewer's sparrow, which together accounted for 85% to 97% of all small bird use, depending on the season (Table 3.3-2) (WEST 2021a). Twenty-one other small bird species (including five special-status species) were recorded, each of which accounted for less than 2% of all small bird use. Large bird use was driven primarily by common raven (*Corvus corax*), which accounted for 43% to 84% of all large bird use. Diurnal raptor use, represented by nine species (and unidentified raptor observations), was higher than any other group of large bird species and accounted for as much as 40% of all large bird use in summer. Waterfowl use, represented by five species (and unidentified duck observations) was almost nonexistent during summer but accounted for more than 16% of all large bird use during winter. Seventeen other large bird species (including nine special-status species) were recorded, each of which account for less than 2% of all large bird use (WEST 2021a). Additional details can be found in WEST (2021a), which is available on BLM's ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2013782/570.

Table 3.3-2. Summary of the First Year of Avian Use Surveys

Common Name	Scientific Name	Spring Mean Use (% of use)	Summer Mean Use (% of use)	Fall Mean Use (% of use)	Winter Mean Use (% of use)
Small Birds					
Horned lark	*Eremophila alpestris*	2.19 (49.9%)	2.36 (62.6%)	4.12 (92.1%)	3.11 (85.7%)
Western meadowlark	*Sturnella neglecta*	1.46 (33.2%)	0.65 (17.3%)	0.20 (4.5%)	0.25 (7.0%)
Brewer's sparrow	*Spizella breweri*	0.22 (4.9%)	0.19 (5.0%)	0.03 (0.7%)	0 (0%)
21 other small bird species	N/A	0.53 (12.0%)	0.57 (15.1%)	0.12 (2.7%)	0.26 (7.3%)
Small birds total	*N/A*	*4.40 (100%)*	*3.76 (100%)*	*4.47 (100%)*	*3.62 (100%)*
Large Birds					
Common raven	*Corvus corax*	1.91 (53.7%)	0.66 (42.5%)	3.84 (84.0%)	3.07 (73.5%)
Diurnal raptors (9 species)	N/A	0.45 (12.7%)	0.61 (39.7%)	0.51 (11.3%)	0.37 (8.8%)
Waterfowl (5 species)	N/A	0.44 (12.4%)	< 0.01 (0.2%)	0.12 (2.7%)	0.69 (16.4%)
17 other large bird species	N/A	0.75 (21.2%)	0.27 (17.6%)	0.09 (2.0%)	0.05 (1.3%)
Large birds total	*N/A*	*3.55 (100%)*	*1.54 (100%)*	*4.57 (100%)*	*4.18 (100%)*

Note: Mean use is the number of individuals observed averaged across all point count plots and all visits. Small bird mean use is reported as the number of individuals observed per 100-m radius plot per 10-minute survey. Large bird mean use is reported as the number of individuals observed per 800-m radius plot per 60-minute survey.

Source: WEST (2021a).

Since small passerines have a low potential to experience population-level impacts from wind energy development (AWWI 2016; Choi et al. 2020; Erickson et al. 2014), the second year of avian use surveys (WEST 2023) focused on large birds, although special-status small birds, if observed, were recorded as incidental observations. The most abundant large birds recorded during the second year of project avian use surveys were common raven, snow goose (*Anser caerulescens*), and unidentified ducks, which together accounted for 42% to 86% of all large bird use, depending on the season (WEST 2023). Thirtyfive other large bird species (including 12 special-status species) were recorded. Diurnal raptor use represented by 11 species (and unidentified raptor observations) was highest in the spring (18.1% of all use) and lowest in the winter (5.4% of all use). Waterfowl use during the second year of avian use surveys was much higher than in the first year, accounting for 52.8% of all use in the fall and 42.7% of all use in the winter but only 1.6% of all use in the spring and 0.9% of all use in the summer (Table 3.3-3). Four special-status small bird species were recorded as incidental observations, with Brewer's sparrow being the most common (WEST 2023). Additional details can be found in WEST (2023), which is available on the BLM's ePlanning website: https://eplanning.blm.gov/eplanning-ui/project/2013782/570.

Table 3.3-3. Summary of the Second Year of Avian Use Surveys

Species Groups	Spring Mean Use (% of use)	Summer Mean Use (% of use)	Fall Mean Use (% of use)	Winter Mean Use (% of use)
Large corvids (3 species)	2.91 (55.9%)	1.54 (41.4%)	2.11 (38.6%)	2.10 (49.0%)
Waterfowl (7 species)	0.08 (1.6%)	0.03 (0.9%)	2.89 (52.8%)	1.83 (42.7%)
Diurnal raptors (11 species)	0.94 (18.1%)	0.50 (13.5%)	0.33 (5.9%)	0.23 (5.4%)
Gulls (2 species)	0.52 (10.0%)	0.76 (20.4%)	0 (0%)	0.06 (1.4%)
15 other large bird species	0.75 (14.4%)	0.89 (23.8%)	0.15 (2.7%)	0.07 (1.5%)
Total	*5.20 (100%)*	*3.72 (100%)*	*5.48 (100%)*	*4.18 (100%)*

Note: Mean use is the number of individuals observed per 800-m radius plot per 60-minute survey.
Source: WEST (2023).

Non-eagle raptor nests in and near the siting corridors were recorded during aerial and ground-based raptor nest surveys during the 2020 and 2021 nesting seasons (WEST 2020, 2021b). Details on occupied non-eagle raptor nests within 1 mile of the current siting corridors are provided in Table 3.3-4. A summary of non-eagle raptor nests beyond 1 mile of the siting corridors is provided below; additional details are provided in the BBCS (Appendix M of MVE [2023]). The raptor nest surveys were conducted to better support the development of avoidance and minimization measures to reduce potential impacts to nesting eagles (see Section 3.3.3 [Eagles]) and raptors.

Table 3.3-4. Occupied (non-eagle) Raptor Nests within 1 Mile of the Siting Corridors

Nest Number	2020 Nest Status	2021 Nest Status	Within Siting Corridors (Yes/No)
17	Ferruginous hawk, occupied-active	Ferruginous hawk, occupied-active	No
18	Unoccupied	Ferruginous hawk, occupied-active	Yes
19	Red-tailed hawk, occupied-inactive	Common raven, occupied-active	No
20	Red-tailed hawk, occupied-active	Common raven, occupied-active	Yes
31*	Burrowing owl, occupied-active	Inactive	No
32*	Burrowing owl, occupied-active	Inactive	No
33*	Burrowing owl, occupied-active	Inactive	No

Nest Number	2020 Nest Status	2021 Nest Status	Within Siting Corridors (Yes/No)
34	No nest observed	Red-tailed hawk, occupied-active	Yes
35	No nest observed	Red-tailed hawk, occupied-active	No
55	No nest observed	Red-tailed hawk, occupied-active	No
59	No nest observed	Unknown raptor, occupied-inactive	No
61	No nest observed	Unknown raptor, occupied-active	No
62	No nest observed	Unknown raptor, occupied-inactive	No
66*	No nest observed	Red-tailed hawk, occupied-active	Yes
67*	Not surveyed	Burrowing owl, occupied-active	Yes
68*	Not surveyed	Burrowing owl, occupied-active	No

* Observed incidentally during other biological surveys; burrowing owl nests were not targeted during either year of survey.
Sources: WEST (2020, 2021b).
Eagle nests are summarized in Section 3.3.3 (Eagles).

During the 2020 nesting season, 22 potential non-eagle raptor nests were recorded, 12 of which were unoccupied (WEST 2020). Of the 10 occupied nests, seven are in or within 1 mile of the siting corridors (see Table 3.3-4) (WEST 2020). The four occupied nests beyond 1 mile of the siting corridors comprised one great horned owl (*Bubo virginianus*) nest, two red-tailed hawk (*Buteo jamaicensis*) nests, and one unknown raptor nest (WEST 2020).

During the 2021 nesting season, 55 non-eagle raptor nests were recorded (WEST 2021b) including 20 of the nests identified in 2020 (one of the unoccupied nests could not be relocated) and 35 new nests. Of the 35 new nests recorded in 2021, 16 are in or within 1 miles of the siting corridors; nine were occupied by raptors (see Table 3.3-4) and the other seven were inactive or occupied by common raven but have the potential to be used by non-eagle raptors in the future. The 19 new nests more than 1 mile from the siting corridors included five Swainson's hawk (*Buteo swainsoni*) nests, five red-tailed hawk nests, and one great horned owl nest. The other eight nests were inactive or occupied by common raven but have the potential to be used by non-eagle raptors in the future (WEST 2021b).

Because of the limited nesting substrate, a number of raptors use humanmade structures, with 16 of the 55 nests identified located on transmission line poles and one western burrowing owl (*Athene cunicularia hypugaea*) nest located under a stock tank.

3.3.2.1.2 SPECIES ANALYZED IN DETAIL

As described in EIS Section 3.3.2.1.2 (Existing and Future Trends and Actions), despite the rapid increase in wind energy development in recent years and the likelihood this trend will continue in the future, direct mortality from collision with turbines at wind energy facilities is unlikely to pose a threat to most avian populations (AWWI 2016; Choi et al. 2020). Small passerine species account for 60% of fatalities at U.S. wind energy facilities but make up more than 90% of all land bird fatalities, and even for those species killed most frequently, turbine-related fatalities constitute a small percentage of their total population size (typically < 0.02%) (AWWI 2016; Erickson et al. 2014). Small passerine species are also at less risk of population-level effects because they are shorter lived and typically reproduce at a higher rate than other taxa (Erickson et al. 2014). This pattern holds true even for special-status passerine species with smaller population sizes (Erickson et al. 2014), but they face other threats to their populations that make them more susceptible to relatively small increases in mortality, especially when sustained over many years. For example, recent modeling suggested that some special-status passerines in California such as bank swallow (*Riparia riparia*) and tri-colored blackbird (*Agelaius tricolor*) could experience regional (i.e., BCR-level) population declines from as few as 1,000 additional turbine-related deaths per year (Conkling et al. 2022).

Large diurnal raptors are generally considered to be at the greatest risk of population-level effects from turbine collisions (AWWI 2016; Choi et al. 2020; Erickson et al. 2014; Watson et al. 2018), but nocturnal raptors such as barn owl (*Tyto alba*) and burrowing owl and smaller raptors such as the white-tailed kite (*Elanus leucurus*) may also be at risk (Conkling et al. 2022). Relatively large increases in mortality (as many as 5,000 additional deaths per year) do not appear to threaten the range-wide populations of raptors with larger, more stable populations such as red-tailed hawk and Swainson's hawk, and smaller, local populations (i.e., within a BCR) may not experience population-level effects from this level of mortality either (Conkling et al. 2022). The same study also revealed that the potential for effects to these local populations is more strongly influenced by their local population size than continental population size (Conkling et al. 2022). Even with vulnerable taxa, such as raptors, there is a high degree of variation among species in the risk of population-level effects because of differences in habitat use and behavior that affect each species' likelihood of colliding with turbines (Erickson et al. 2014; Watson et al. 2018). Although information on each species use of the RSH is provided for species recorded during project avian use surveys, the relationship between collision likelihood and bird behavior near turbines is complex and not well understood (AWWI 2016; Watson et al. 2018). Some species that fly in the RSH frequently and forage near turbines (such as red-tailed hawk) appear to have higher fatality rates, whereas other species that fly actively around wind turbines (such as common raven) appear to avoid collisions (AWWI 2016).

The species analyzed in detail in this EIS meet all three of the criteria in Table 3.3-5.

Table 3.3-5. Analysis Criteria

No.	Description
1	The species has been observed in the siting corridors or has the potential to occur in the siting corridors because breeding, foraging, or migratory stopover habitat for the species is present and the species has been recorded in similar habitats within 4 miles of the siting corridors.
2	The species has a moderate to high potential of colliding with turbines based on if and how the species uses the RSH and the frequency with which the species been detected as fatalities at existing wind energy facilities.
3	The species has one or more demographic characteristics that make it susceptible to small increases in mortality; namely, they have a small and declining population in BCR 9, are long lived, have a low reproductive rate, and are dependent on high annual survivorship to sustain their population.

A variety of avian species have been documented in and within 4 miles of the siting corridors, and most of these species do not carry special-status designations. Species without special-status designations generally have relatively large and stable populations and thus do not meet the criterion 3 for detailed analysis. There are 35 avian species with special-status designations that have been recorded in the siting corridors or that have the potential to occur in the siting corridors (not including eagles, which are addressed in Section 3.3.3 [Eagles], or greater sage-grouse, which is addressed in Section 3.3.4 [Greater Sage-grouse]). These species may have declining or vulnerable populations and could be at risk of population-level effects from fatalities due to collision with turbines (Watson et al. 2018). Each of these species was evaluated for its potential to experience population-level effects based on the three criteria described above. Of those species, 31 did not meet one or more of these criteria and are not analyzed further in this EIS; Table App3-3 in EIS Appendix 3 provides a list of these species and the rationale for not analyzing them further. Although these species may be affected by the project, effects are not expected to be at the population level or substantially influence the NEPA decision. Thus, to comply with 40 CFR 1502.2(b), this EIS "has only [a] brief discussion of other than significant issues" and focuses on species with a moderate to high likelihood of population-level effects from wind energy development.

Four special-status avian species met all three analysis criteria: ferruginous hawk, long-billed curlew (*Numenius americanus*), short-eared owl (*Asio flammeus*), and western burrowing owl.

Ferruginous Hawk

The ferruginous hawk is large buteo that breeds throughout western North America from southern Canada between the Great Plains and Rocky Mountains south to northern Arizona and New Mexico (IDFG 2017). Ferruginous hawks overwinter in the southwestern United States, California, and central Mexico (Ng et al. 2020), though a small number remain in southern Idaho year-round (IDFG 2017). During the summer breeding season, they are distributed throughout the shrub-steppe communities of the Snake River Plain but are relatively uncommon with approximately 625 breeding adults in the state (IDFG 2017). In total, 31 ferruginous hawks were recorded during the first year of project avian use surveys, which accounted for less than 6% of all diurnal raptor use and less than 1% of all large bird use (WEST 2021a). Only 12 ferruginous hawks were recorded during the second year of avian use surveys, which accounted for approximately 2% of all diurnal raptor use and less than 0.2% of all use (WEST 2023). Ferruginous hawk use was highest in the summer (the breeding season) during the first year (WEST 2021a), but only one ferruginous hawk was recorded during summer of the second year (WEST 2023). Two active ferruginous hawk nests were identified across both years of raptor nest surveys (see Table 3.3-4) (WEST 2020, 2021a, 2021b). No ferruginous hawks were recorded during the winter of the first year (WEST 2021a) or fall of the second year (WEST 2023).

Ferruginous hawks are long lived (up to 20 years) and have low reproductive output (mean annual fledgling rates of 2.0–3.2 fledglings per breeding pair, and average fledgling success rate of 1.3 young per breeding pair). Ferruginous hawks also rely on high annual survivorship to sustain their populations, with an estimated first year survival rate of 55% and likely 75% or more from the second year on (Ng et al. 2020). The ferruginous hawk is a BLM special-status species and an Idaho SGCN (IDFG 2023), which indicate management intervention is likely to be necessary to prevent long-term declines and a trend toward listing under the ESA. There are other local populations in BCR 9 that are considered even more imperiled, such as in Washington state, where the species is listed as an endangered species by the state (Washington Department of Fish and Wildlife 2022).

Ferruginous hawks regularly fly within the RSH (WEST 2022, 2023), but few fatalities have been documented at existing U.S. wind energy facilities (13 total, or 0.1% of all recorded fatalities) (Allison and Butryn 2020). This low percentage may be in part due to the non-random nature of the facilities included in the database, which is heavily skewed toward facilities in the Midwest and eastern United States that are outside the range of the ferruginous hawk. However, no ferruginous hawk fatalities have been recorded at any of the existing wind energy facilities in Idaho for which data are available (Hallingstad et al. 2013; SWCA 2015; Tetra Tech 2014, 2015). Recent modelling indicates that turbine collisions could be a substantial source of mortality for ferruginous hawks and that the species is at moderate risk of experiencing population-level effects from this mortality (Beston et al. 2016). This risk was moderated by the fact that wind energy facilities are currently present across less than half of the species' range, and thus, the risk to the species may increase as wind energy expands further into its range. The presence of active nests suggests that many of the ferruginous hawk fatalities that could be expected from collision with operational turbines would be breeding adults, and therefore, turbine collisions may affect not only adult survivorship, but also fledgling success. Studies of buteo nesting success in relationship to wind energy development have found that, unlike other buteos studied, ferruginous hawk nest success decreases as the number of turbines within their home range (defined as 32 square kilometers [km^2]) increases (Kolar and Bechard 2015). Juveniles in areas with high turbine density were also more likely to die from predation or starvation (Ng et al. 2020). Ferruginous hawks commonly use utility structures such as transmission line towers for nesting, especially in relatively flat landscapes that lack naturally elevated locations for nesting (Ng et al. 2020; Steenhof et al. 1993). Considering that the ferruginous hawk is a long-lived species and has a low reproductive rate, even a small increase in fatalities during the breeding season over multiple years could cause population impacts.

Long-Billed Curlew

The long-billed curlew is a large shorebird that breeds in prairie and intermountain grassland basins of western North America, including southern Idaho (IDFG 2017). The species overwinters in coastal and inland habitats in California, Texas, and Louisiana as well as estuaries along the coast of Mexico and locally in central Mexico (Dugger and Dugger 2020). Sixteen long-billed curlews were recorded during the first year of avian use surveys, and 88 long-billed curlews were recorded during the second year of avian use surveys. Long-billed curlew use could be higher in particularly wet years when playas and vernal pools in the siting corridors are inundated. All long-billed curlew use during the first year occurred in the spring (WEST 2021a). Long-billed curlew use was highest in the spring during the second year, but long-billed curlews were also recorded in the summer and winter (WEST 2023).

Like the ferruginous hawk, the long-billed curlew is a long-lived species with a relatively low reproductive rate. Demographic studies of the long-billed curlew have shown that stable populations require very high adult survivorship (upward of 85%–90%) and that population stability is strongly affected by juvenile and subadult mortality during migration (Redmond and Jenni 1986). Given this, even a relatively small increase in mortality or reduction in reproductive output could negatively impact their populations. The long-billed curlew is a BLM-sensitive species and Idaho SGCN (IDFG 2023), which indicate management intervention is likely to be necessary to prevent long-term declines and a trend toward listing under the ESA.

Although long-billed curlew fatalities have been recorded at other U.S. wind energy facilities, they account for only 0.1% of all recorded fatalities (10 fatalities total) (Allison and Butryn 2020), and all shorebird flights recorded during the first year of project avian use surveys occurred below the RSH evaluated in this EIS (WEST 2022), whereas 22% of shorebird flights occurred within the RSH during the second year of avian use surveys (WEST 2023). No long-billed curlew fatalities were recorded at existing wind energy facilities in Idaho for which data are available, but the study periods for Power County Wind and Rockland Wind did not include the times of year when long-billed curlews are most likely to be present (Hallingstad et al. 2013; SWCA 2015; Tetra Tech 2014, 2015). Overall, this suggests that long-billed curlew are at a fairly low likelihood of colliding with turbines but could also be a result of the relative lack of studies at facilities in the long-billed curlew’s range, and the species could be at risk of population-level effects as wind energy expands further into its range (COSEWIC 2011).

Estimates of the long-billed curlew population size in BCR 9 are not available, but the Great Basin population is estimated at 40,000 individuals, which is 32% of the estimated North American population of 123,500 (IDFG 2017). Idaho supports as much as 31% of the long-billed curlew population in BCR 9 (American Bird Conservancy 2013); the highest concentrations of curlews in Idaho occur to the west of the area managed by the SFO in the administrative boundary of the BLM Four Rivers Field Office (IDFG 2017). Although the long-billed curlew population in BCR 9 appears to be increasing, the species is in decline throughout much of its range (Sauer et al. 2019), and some have raised questions as to the validity of this trend (IDFG 2017). Given the importance of the local breeding population in Idaho to the overall population of long-billed curlews in BCR 9, the possibility that even a relatively low fatality rate could result in a population decline in BCR 9 cannot be ruled out.

Short-Eared Owl

The short-eared owl has a large, global range that includes all of Idaho, but the distribution of local breeding populations is closely tied to the abundance of small mammal prey. The species is more

migratory in the northern portion of its range, but there are winter records of short-eared owls in southern Idaho (IDFG 2017). During the first year of avian use surveys, 17 individuals were recorded at three point count locations; use occurred in all seasons except winter and peaked in summer (WEST 2021a).
One short-eared owl was recorded during the second year of avian use surveys, during the winter (WEST 2023). However, the avian use surveys were not designed to detect owls, and actual short-eared owl use may be higher.

Short-eared owls are long lived (the oldest wild bird recorded was nearly 13 years old). Although clutch size is high (3–8), nest success can be quite low (near 60% in ungrazed grassland and only 10% in grazed grassland), which leads to relatively low reproductive output overall. Short-eared owls are ground nesters and require large (> 247 acres), open areas with sufficient low vegetative cover (i.e., grasses and forbs) for nest construction. Consequently, they are sensitive to habitat disturbance and fragmentation (Wiggins et al. 2020). Adult survival rates are unknown, but like other species with low reproductive output, high adult survival is likely important for maintaining populations. The short-eared owl is a BLM-sensitive species, BCC, and Idaho SGCN (IDFG 2023), which indicate management intervention is likely to be necessary to prevent long-term declines and a trend toward listing under the ESA.

All owl flights observed during avian use surveys were below the RSH evaluated in this EIS (WEST 2022, 2023). Most short-eared owl foraging flights occur below 10 feet, though they may hover as high as 100 feet on occasion. Males are at greater risk of turbine collisions at the onset of the breeding season when they engage in higher-altitude aerial displays over their territories to attract females (Wiggins et al. 2020). There have been 18 documented fatalities (0.2% of all recorded fatalities) at existing U.S. wind energy facilities for which data are available (Allison and Butryn 2020). No short-eared owl fatalities have been recorded at any of the existing wind energy facilities in Idaho for which data are available, though the study period for Rockland Wind did not completely cover the summer breeding period when collision risk for short-eared owls is highest (Hallingstad et al. 2013; SWCA 2015; Tetra Tech 2014, 2015).

The short-eared owl population in BCR 9 is small (approximately 69,000 [Partners in Flight 2022]) and declining (though confidence in this trend is moderate) (Sauer et al. 2019). Assessments of the species status and conservation needs have not identified direct mortality from wind energy development as a major threat to short-eared owl populations. However, short-eared owl use during the summer breeding season was recorded during the avian use surveys, and males engaged in mating displays could be killed by turbine collisions. Given the species' low reproductive output and small, declining population, even a relatively small increase in fatalities during the breeding season could impact the short-eared owl population in BCR 9.

Western Burrowing Owl

The western burrowing owl occurs throughout southern Idaho and in the far western reaches of the state during the summer breeding season. The species overwinters in the far southern United States and Central America (IDFG 2017). Ten burrowing owls were recorded during the first year of avian use surveys (WEST 2021a), and eight were recorded during the second year of avian use surveys (WEST 2023), though actual burrowing owl use is likely to be higher because surveys were not designed to detect the species. Burrowing owl use was highest in spring and summer, low in fall, and absent in winter (WEST 2021a, 2023). Five active burrowing owl nests were also recorded incidentally during other biological surveys in 2020 and 2021 (see Table 3.3-4) (WEST 2020, 2021b).

The burrowing owl is a relatively long-lived (up to 8 years) species that exhibits high interannual variability in reproductive success and juvenile survival, which appear to be primarily linked to food availability and weather events (which can collapse the burrows of this ground-nesting species). Given this, fledgling success rates can vary from as few as 1.6 to as many as 7.4 young per nest. In Idaho, nests near irrigated agriculture were more productive than those nesting further way. Juvenile survivorship is low (only 20%–30% survive their first year), so greater reproductive output may be necessary to sustain healthy populations of breeding adults. Adult survivorship is much higher (68%–81%), which may also be important for maintaining populations (Poulin et al. 2020).

All owl flights observed during the avian use surveys occurred below the RSH evaluated in this EIS (WEST 2022, 2023), and there are only 6 documented burrowing owl fatalities at existing U.S. wind energy facilities for which data are available (0.1% of all recorded fatalities) (Allison and Butryn 2020). No western burrowing owl fatalities have been recorded at any of the existing wind energy facilities in Idaho for which data are available, though the study periods for Power County Wind and Rockland Wind did not completely cover the spring and summer seasons when burrowing owl use in the siting corridors is highest (Hallingstad et al. 2013; SWCA 2015; Tetra Tech 2014, 2015). However, 70 burrowing owl fatalities were recorded at the Altamont Pass Wind Resource Area in California (which is not included in the Allison and Butryn [2020] data) over a 5-year period, leading to an estimated fatality rate of 99 to 380 burrowing owls per year (Smallwood et al. 2007). Although this is likely due in part to the particularly high concentration of nesting burrowing owls in the area and older-model turbines with RSHs much closer to the ground, it does indicate that burrowing owl fatality rates can be higher when turbines are sited in areas where they nest. The viability of the species is unlikely to be threatened by direct mortality from wind energy development (Diffendorfer et al. 2021), but modeling indicates that some regional (i.e., BCR-level) populations could experience declines from as few as 1,000 additional deaths (Conkling et al. 2022). The western burrowing owl is a BLM special-status species, a BCC, and an Idaho SGCN (IDFG 2023).

The BCR 9 population of burrowing owls is currently estimated to be 60,000 individuals, which is approximately 6% of the species' North American population (Partners in Flight 2022). The western burrowing owl population in BCR 9 has been decreasing since 1966 but increasing in recent years (1997–2017), though there was only a moderate confidence in these trends (Sauer et al. 2019). Given that western burrowing owls are known to breed in the siting corridors and likely depend on high reproductive output and adult survivorship to maintain their population in BCR 9, even a relatively small increase in fatalities during the breeding season, or a small reduction in reproductive output, could impact their population in BCR 9.

3.3.3 Eagles

3.3.3.1 Affected Environment

The analysis area for eagles is the area within 109 miles of the siting corridors for golden eagle and the area within 86 miles for bald eagle (*Haliaeetus leucocephalus*) (Figure 3.3-5).

USFWS (2013) and the *Final Programmatic EIS for the Eagle Rule Revision* (USFWS 2016a) recommend that siting decisions for project infrastructure, such as wind turbines, be informed first by eagle exposure (related to eagle sightings during avian surveys) and then by the presence of important eagle use areas such as occupied nests or foraging areas. MVE conducted avian surveys to characterize species composition and patterns of use in and near the siting corridors (WEST 2021a, 2023) in accordance with USFWS (2012). Surveys were conducted on-site, once per month during daylight hours, between April 3, 2020, and April 17, 2022. Aerial and ground-based raptor nest surveys were conducted during the 2020 and 2021 nesting seasons to record eagle nests within 10 miles (2020) and within 2.5 miles (2021) of the siting corridors (WEST 2020, 2021b). The USFWS (2013) protocol for data collection to support an eagle incidental take permit application recommends that surveys for occupied nesting territories be conducted out to 10 miles around the perimeter of the area where take may occur; this recommendation was revised in April 2020 to 2 miles and is the reason for the difference between nest survey areas.

Bald eagles place their nests in large deciduous or coniferous trees or cliffs, with a commanding view of the area, less than 1 mile from appropriate aquatic foraging conditions (e.g., perennial rivers or lakes containing fish) (Buehler 2000). The species communally roosts in the winter in large (15–60 m in height) deciduous or coniferous trees that tend to be located near (less than 50 m) aquatic foraging sites but may be located more than 6 miles from them (Buehler 2000; USFWS 2013). Wintering/non-breeding individuals and juveniles are typically associated with breeding habitats; however, they may range widely in search of food, shelter, and reduced human presence (Buehler 2000). Bald eagles nest in three primary areas in Idaho, with the largest nesting population in eastern Idaho along the North and South Forks of the Snake River and its tributaries; in the Pend Oreille River drainage and the Kootenai Valley; and the North Fork of the Payette River drainage, including Cascade Reservoir (Sallabanks 2006). The siting corridors are located outside these areas in the USFWS Idaho Bald Eagle Management Area 17. In 2006 (the last year for which monitoring data are available), the management area contained three occupied breeding territories generally located north of the siting corridors near the confluence of Little Wood River and Silver Creek and near Magic Reservoir (Sallabanks 2006). Nest surveys in 2020 recorded an active bald eagle nest south of the siting corridors near Wilson Lake Reservoir (WEST 2020; see discussion below).

The siting corridors and vicinity generally lack suitable nesting habitat and provide limited foraging habitat for bald eagles (173 acres of intermittently filled stock ponds and 47 acres of irrigation canals). Seasonally inundated playas may, particularly in wet years, provide intermittent habitats where waterfowl or shorebirds could congregate and provide hunting opportunities. Limited riparian habitat and perennial waters near the siting corridors could provide limited foraging habitat; however, larger bodies of water (such as the Snake River, Magic Reservoir, and Wilson Lake Reservoir) provide more preferred foraging conditions and are located more than 2 miles from the siting corridors. Animal carcasses may be present and would provide an intermittent source of carrion, particularly for wintering bald eagles. The siting corridors and vicinity do not contain suitable nesting habitat for bald eagles due to the general lack of tall trees and large open bodies of water.

Golden eagles require large open hunting grounds adjacent to mountainous canyonland and rimrock terrain of open desert, grassland, and forested areas (Katzner et al. 2020; Marzluff et al.1997). Presence of sizeable shrub (e.g., sagebrush, rabbitbrush) patches is an essential component of golden eagle home ranges (Marzluff et al. 1997). Nests are placed in rugged terrain (e.g., cliffs) and less often in tall trees and on humanmade structures (e.g., transmission structures) (Katzner et al. 2020). Wintering/non-breeding individuals and juveniles are typically associated with breeding habitats; however, they may range widely in search of food (Katzner et al. 2020). Nesting density in Idaho tends to be higher in areas bordered by shrub-steppe and grassland than in areas bordered by agriculture. Golden eagles are opportunistic predators, preying mainly on mammals (particularly black-tailed jackrabbit [*Lepus californicus*] and cottontails [*Sylvilagus* sp.]) but will also feed on carrion, especially in the winter. Prey availability is a major influence on occupancy of nesting territories by pairs of golden eagles, and especially on the likelihood nests are used. This species often constructs alternate nests within a single territory (IDFG 2017). Golden eagle breeding territory size at study sites in southwestern Idaho ranged from 2,869 acres (4.5 square miles) to 12,103 acres (18.9 square miles) (Collapy and Edwards 1989) and is assumed to be similar for breeding golden eagles in the LAP. Nest surveys for the project in 2020 recorded two active golden eagle nests located generally northwest and west of the siting corridors (WEST 2020; see discussion below).

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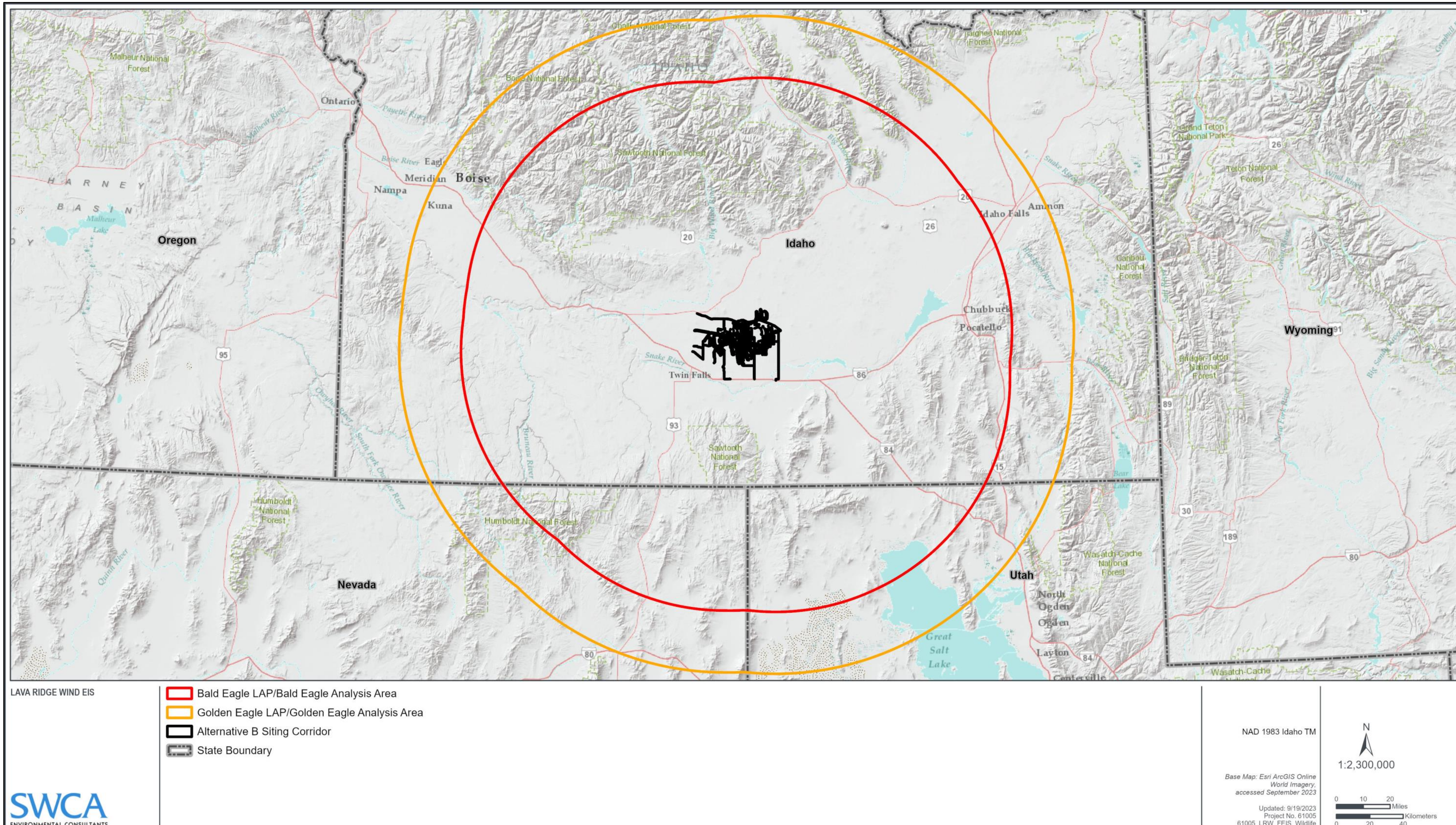

Figure 3.3-5. Eagle analysis areas.

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Foraging habitat for golden eagles is present in the golden eagle LAP. The sagebrush, steppe, woodland, and grassland communities host prey species important for golden eagle nesting success, and the relatively undeveloped conditions in the siting corridors and vicinity provide expansive areas for foraging. Animal carcasses may also provide an intermittent source of carrion. The proximity of active golden eagle nests and observations (see discussion below) indicate that the siting corridors are actively used by these nearby nesting eagles and others. The siting corridors do not contain preferred nesting habitat for golden eagles due to the lack of cliffs and rugged topography, though presence of large transmission structures provides nesting opportunity.

During the 2020 nesting season, two golden eagle nests (one at Crater Butte and one west of Shoshone) and one bald eagle nest (near Wilson Lake Reservoir) were identified within 10 miles of the siting corridors; all three nests were occupied, but the golden eagle nest at Crater Butte, though "occupied," was inactive for the 2020 breeding season (i.e., the nest was occupied, but breeding behavior was not observed) (WEST 2020). During the second 2020 survey, greenery was observed in the Crater Butte nest and an adult was perched nearby, but nesting was not recorded. The other two nests contained two nestlings in each during the second survey. The golden eagle nest first observed in 2020 at Crater Butte was revisited during the 2021 surveys, and during the second 2021 survey, the nest contained one nestling (WEST 2021b). The nest is located more than 2 miles from the siting corridors. No eagle nests were recorded within 2.5 miles of the siting corridors, likely due to the lack of suitable eagle nesting substrate (such as large trees or cliff faces) (WEST 2021b). Based on the survey results, two golden eagle breeding territories and one bald eagle breeding territory are present within 10 miles of the siting corridors, and the siting corridors provide suitable foraging habitat for golden eagles. Bald eagles may also use limited waterbodies and riparian areas for foraging, as well as carrion, though this species was not observed during project avian surveys (see discussion below).

Surveys for large birds, including eagles (described in more detail in Section 3.3.2.1.1), were conducted for the project. Golden eagle was the only eagle species recorded during the project's first avian survey season and made up 1.9% of large bird use in the summer and less than 1.0% in all other seasons. Both bald and golden eagles were observed during the second avian survey season, with bald eagle making up less than 0.1% of large bird use in fall and winter and none in spring and summer and golden eagle making up 1.7% in the winter and less than 1.0% in the remaining seasons. Golden eagle use was observed throughout the siting corridors, with no apparent patterns of concentrated use discernable from observations, and bald eagle use was only observed at three locations. Areas of higher use were associated with transitional habitats available near residential and agricultural development.

Eagle use of the siting corridors and surrounding area was documented by the number of minutes an eagle was observed in flight (see WEST [2021a] for more detail). During the project's 2 years of avian surveys, 1,040 golden eagle minutes were recorded in 1,430 hours of survey. Of these, 152 minutes were within the risk cylinder (defined as the area within 800 m of the survey point and below the upper limit of RSH zone during the 60-minute survey period); these are referred to as exposure minutes. The highest exposure minutes per survey hour were recorded in December and October. June 2021 and April 2022 were the only months with no golden eagle observations within the risk cylinder. Golden eagle flight heights were recorded most frequently (70%) below the RSH zone (130–790 feet), and fewer flights were recorded within (18%) and above (12%) the RSH zone (WEST 2022).

During the project's 2 years of avian surveys, 50 bald eagle minutes were recorded in 1,430 hours of survey. Of these, 11 minutes were within the risk cylinder. The highest exposure minutes per survey hour were recorded in October 2021, though observations were only recorded in October 2021 and in February and March 2021. Bald eagle flight heights were recorded most frequently (67%) below the RSH zone (130–790 feet) and less frequently (33%) within the RSH zone (WEST 2023).

The size of the LAPs is estimated by applying the density estimates at the finest scale available (BCR scale) to the LAP (USFWS 2016a). The golden eagle LAP is estimated to contain approximately 997 golden eagles, and the bald eagle LAP is estimated to contain approximately 123 bald eagles (see EIS Appendix 6). Recent USFWS modeling shows that golden eagle populations nationwide are either declining slightly or in the early stages of a decline since 2009 (USFWS 2016a). The nationwide population trend for bald eagle is increasing or stable, though a population decrease in the Northern Rockies EMU between 2007 and 2009 was observed (USFWS 2016a). Additional information on the life history and status of the bald and golden eagles, as well as known threats to the species, are included in USFWS (2016a) and in the *Bald and Golden Eagles: Population Demographics and Estimation of Sustainable Take in the United States, 2016 Update* (USFWS 2016b).

3.3.4 Greater Sage-grouse

3.3.4.1 Affected Environment

3.3.4.1.1 SAGE-GROUSE HABITAT

The analysis area for greater sage-grouse is Timmerman Hills and Craters of the Moon sage-grouse habitat assessment framework (HAF) fine-scale habitat units (Figure 3.3-6) (BLM 2018a, 2020).

Sage-grouse are dependent on sagebrush habitats throughout the year, though they also exhibit some seasonal differences in habitat use (detailed below). Mature sagebrush habitat (> 10% cover) covers approximately 33% of the analysis area (Xian et al. 2015) (Figure 3.3-7) and another 22% of the analysis area is sagebrush with 5% to 10% cover. In the siting corridors, sagebrush habitat generally occurs in the north and east where it is interspersed with herbaceous communities (WEST 2020, 2021). The land surrounding the eastern, southern, and western portions of the siting corridors is mostly cultivated cropland. Across the distribution of sage-grouse, the loss and degradation of sagebrush habitat have extirpated sage-grouse from nearly half its original range (Schroeder et al. 2004), contributing to sage-grouse being a special-status species that was considered for protection under the ESA in 2010. The causes of habitat loss and degradation in the landscape relevant to the project include sagebrush habitat loss due to wildfire (BLM 2020, 2022); conversion of sagebrush to agriculture; invasion of nonnative, annual grasses; energy and housing development; and sagebrush control (USFWS 2013). The USFWS's "warranted, but precluded" finding regarding the potential ESA listing (USFWS 2010) prompted the publication of BLM (2015a), which provides a broad, landscape-level, national greater sage-grouse conservation strategy.

The BLM HAF is used to define the fine-scale habitat units that make up the analysis area (described above) and is used to define greater sage-grouse habitat suitability for all seasonal habitat types at varying landscape scales (BLM 2015b). The HAF discusses four scales for assessing sage-grouse habitat suitability (Table 3.3-6). These scales provide a tiered approach to assessing impacts on the landscape and are important because habitat selection occurs at multiple spatial scales (Johnson 1980), and different resources may be selected at each scale. In addition, threats to sage-grouse and their habitat may be important at some scales and less so at others (Stiver et al. 2006). Habitat selection at multiple spatial scales must be considered for effective and efficient conservation and management (BLM 2015b; Johnson 1980).

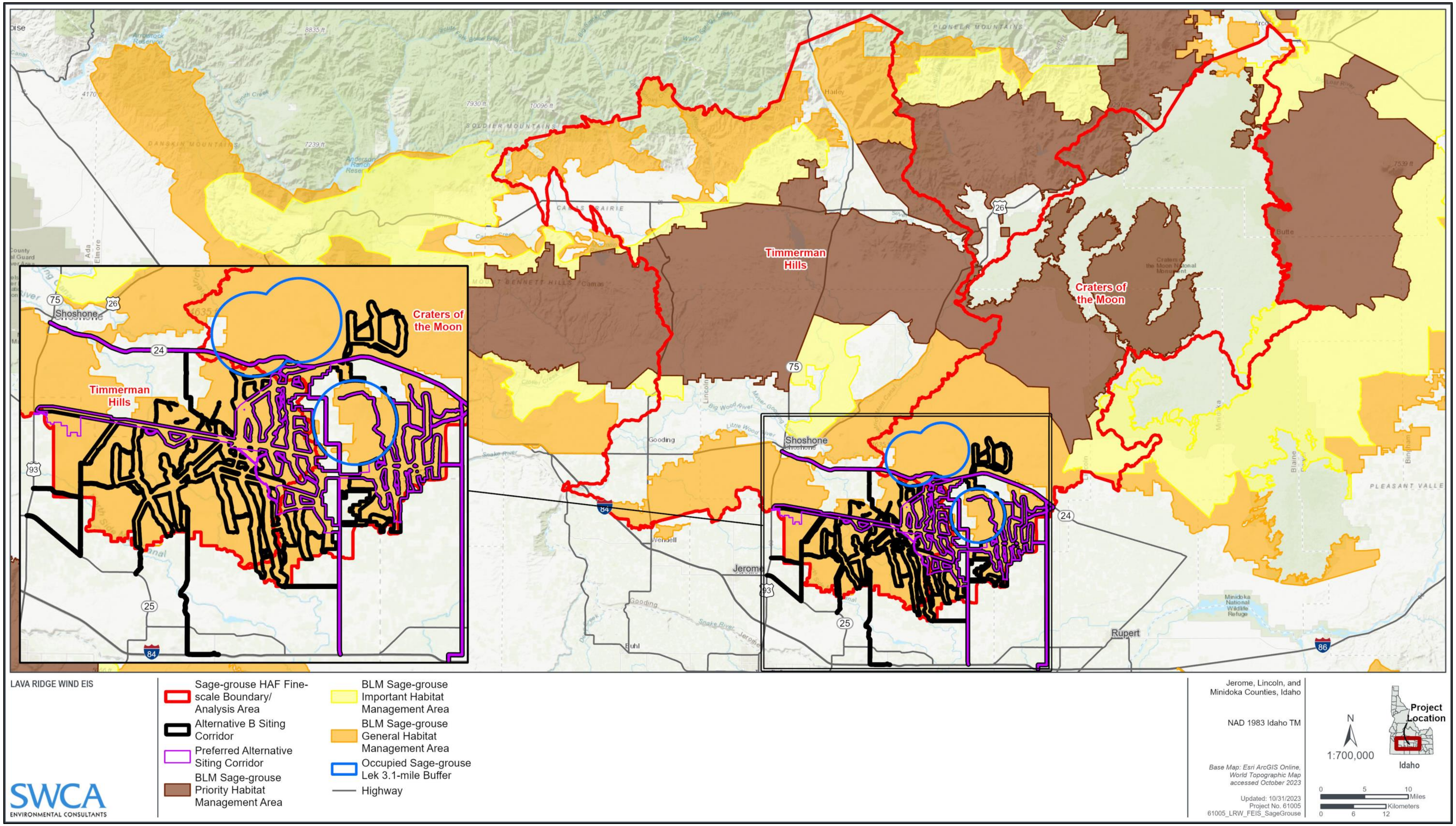

Figure 3.3-6. Greater sage-grouse analysis area.

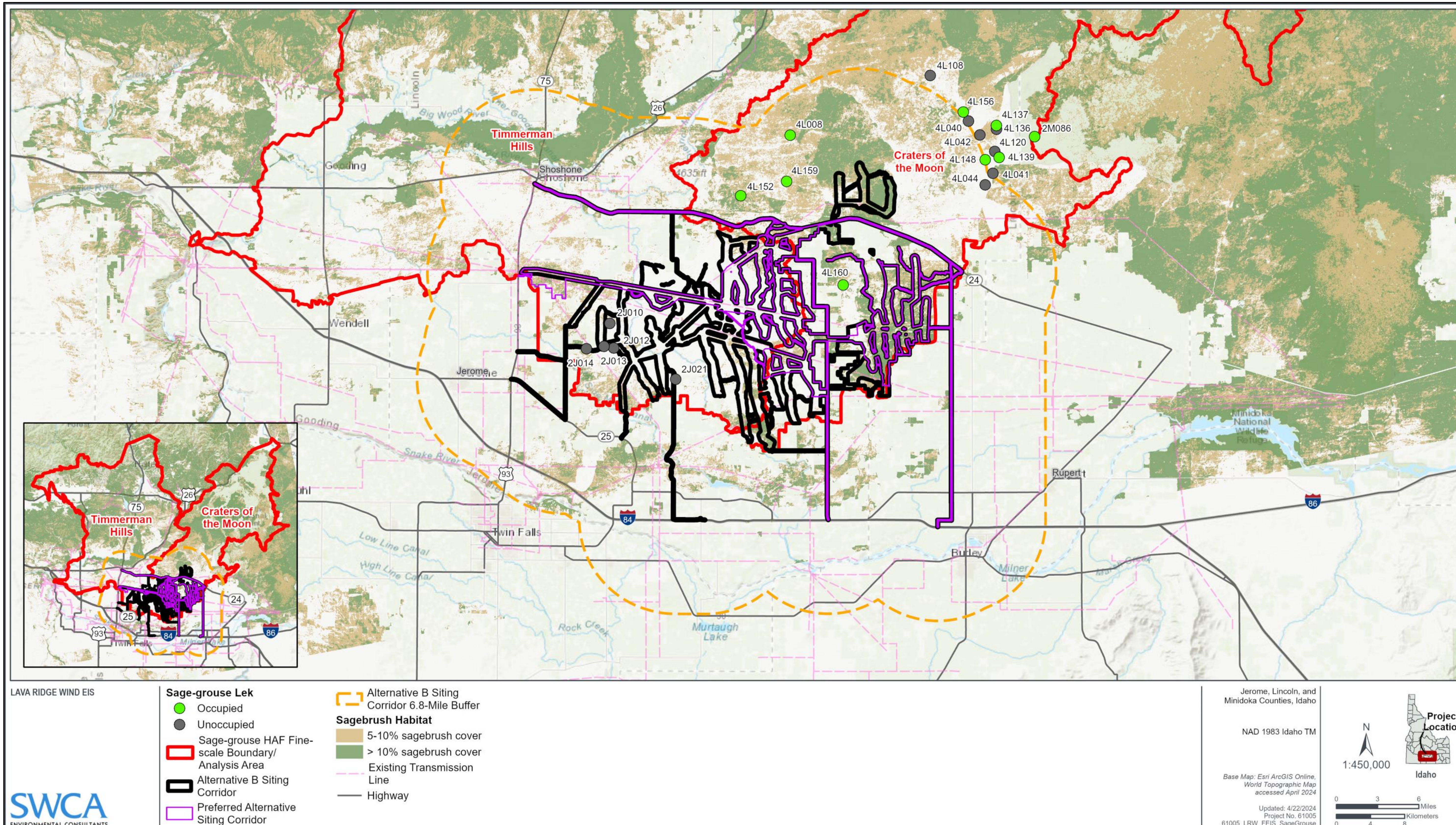

Figure 3.3-7. Greater sage-grouse leks and sagebrush habitat.

Table 3.3-6. Greater Sage-grouse Habitat Assessment Framework Spatial Scales

HAF Scale	Description	Indicators of Habitat Quality
Broadscale	This scale is the range-wide distribution of sage-grouse populations throughout the West.	The range-wide potential pre-settlement habitat of both species of sage-grouse (greater sage-grouse and the Gunnison sage-grouse [*Centrocercus minimus*]) (1,200,483 km^2 [approximately 463,500 square miles]), which has declined 44% to a current distribution of approximately 668,412 km^2 (approximately 258,000 square miles). Habitat quality is assessed by the availability of large expanses of sagebrush or grass-sagebrush habitat, presence of migration corridors, and juxtaposition of other habitats and land uses within these large expanses.
Mid-scale	This scale accounts for how breeding populations move or disperse within a larger landscape to meet this species' seasonal habitat requirements. This is the scale where sage-grouse occupancy and dispersal are defined by the juxtaposition and extent of sagebrush habitat within a larger matrix of unsuitable habitat.	Landscapes have connected mosaic sagebrush shrublands that allow for bird dispersal and migration movements within the population or subpopulation area. Anthropogenic disturbances that can disrupt dispersal or cause mortality are generally not widespread or are absent.
Fine scale	This scale accounts for an individual's home range and seasonal habitats within the home range (e.g., brood-rearing habitat within a home range).	Home ranges have connected SUAs. Anthropogenic features that disrupt seasonal movements or cause mortality are generally absent or at least not widespread.
Site scale	This scale accounts for vegetation structure and composition characteristics within specific seasonal habitats, which provide for daily needs, including forage and cover needed for breeding, brood-rearing, and winter survival.	Sagebrush cover and height, perennial grass cover and diversity, forb abundance and diversity, juniper canopy cover, invasive annual grasses.

Sources: BLM (2015b); Connelly et al. (2004); State of Idaho (2021a).

Three seasonal habitats are essential to maintaining greater sage-grouse populations: spring habitat that includes breeding, nesting, and early brood-rearing habitats; summer habitat that includes late brood-rearing habitat; and wintering habitats. BLM (2015a) identifies specific habitat objectives for each seasonal habitat type, including the characteristics that represent the desired habitat needs for sage-grouse (sagebrush cover, sagebrush height, perennial grass cover, and preferred forb abundance). Leks, or breeding display grounds, are usually composed of relatively bare, open areas surrounded by sagebrush (Connelly et al. 2000). Nesting habitat is characterized by areas of taller, broader sagebrush shrubs (Dinkins et al. 2016), whereas mesic areas are used for brood-rearing (Atamian et al. 2010). Winter habitat is characterized by areas of high sagebrush density and less rugged terrain (Carpenter et al. 2010). Generally, lekking habitat is not a limiting factor on the landscape, but nesting habitat is.

Though different, both lekking and nesting habitats make up sage-grouse habitat needs during the breeding season. These habitats are linked because hens usually nest near leks (Coates et al. 2013; Holloran and Anderson 2005). Since hens with broods are often near the nest within the first few days to a week or more after nests hatch (Connelly et al. 2004), early brood-rearing habitat is also linked with lekking and nesting habitats. Connelly et al. (2004) summarized the average distance between a female's nest and the lek where she was captured for several locations throughout the sage-grouse range: 1.7 miles (2.7 km) in Montana (Wallestad and Pyrah 1974), 2.1 miles (3.4 km) in Idaho (Fischer et al. 1997), 2.5 miles (4.0 km) in Colorado (Hausleitner 2003), 2.9 miles (4.6 km) in Idaho (Wakkinen et al. 1992), and 4.8 miles (7.8 km) in Washington (Schroeder et al. 1999). In a Wyoming population, 64% of hens nested within 3.1 miles (5 km) of leks (Holloran and Anderson 2005). In Strawberry Valley, Utah, Peck (2011) reports the average distance from nests to the nearest lek was 2.7 miles (4.3 km). In California, 95% of nests and 90% of seasonal movements occur within 3.1 miles of leks (Coates et al. 2013).

In Idaho, highly variable movement distances have been recorded within and among seasonal habitats (Connelly et al. 1988; Fedy et al. 2012; Leonard et al. 2000). Timing of movements between seasonal habitats can be variable among individuals and between males and females. Movement between summer and winter habitat occurs from August through December and the timing can be weather-dependent (Connelly et al. 1988). Movement from breeding to summer range occurs from late April through early July. These studies illustrate the variable and sometimes long-distance movements between seasonal ranges for populations in Idaho. In Wyoming, Holloran and Anderson (2005) suggest the proportion of hens nesting farther than 3.1 miles from leks could be important for population viability in Wyoming. These studies support the importance of SUAs, in addition to lek buffers, designated by BLM (2015a) to reduce project impacts to sage-grouse during their entire life cycle.

BLM (2015a) defines and maps sage-grouse HMAs based on the quality of existing habitat and conservation priorities. The analysis area (see Figure 3.3-6) contains several types of mapped HMAs and areas not mapped as being part of an HMA (Table 3.3-7) as per BLM (2015a). Approximately 91% of the siting corridors is located within the General HMA, which is described as “generally characterized by lower quality disturbed or patchy habitat of low lek connectivity” (BLM 2015a). The remaining 9% of the siting corridors is not part of an HMA. All types of SUAs for sage-grouse are present in the analysis area and the siting corridors (Figure 3.3-8, Table 3.3-8). Although the project could cause declines in the sage-grouse population in this area due to impacts to all life phases related to seasonal habitat used throughout the year, the siting corridors do not contain the most important habitat for sage-grouse (i.e., Priority HMA or Important HMA; see Table 3.3-7). Seasonal use periods are defined as spring (March 1 to June 30), summer (July 1 to September 22), and winter (December 1 to February 29) (BLM 2018a, 2020). Sage-grouse lekking habitat is included in spring habitat, which should encompass breeding, nesting, and early brood-rearing habitat. Summer habitat includes late brood-rearing habitat.

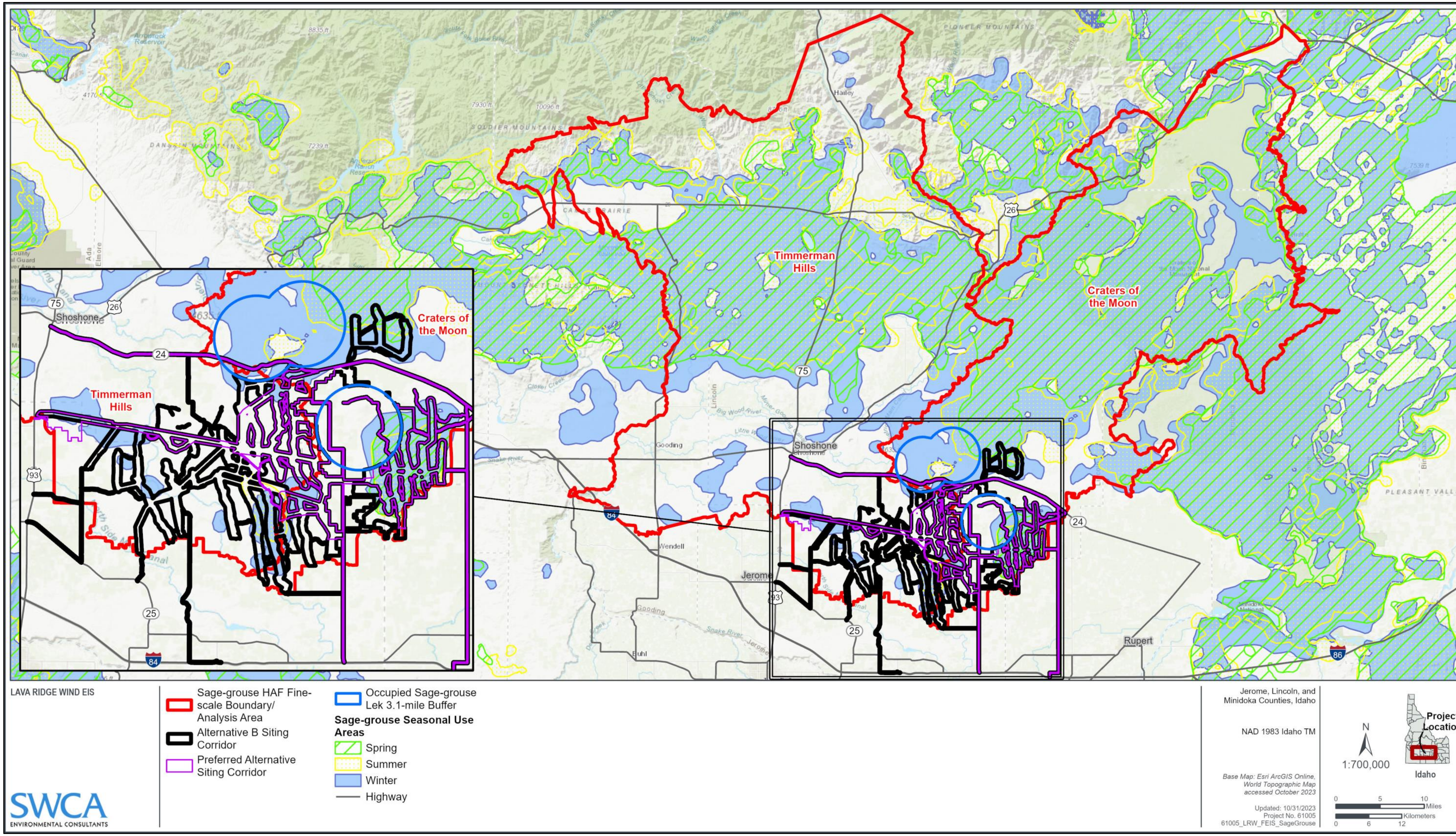

Figure 3.3-8. Greater sage-grouse seasonal use areas.

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Table 3.3-7. Greater Sage-grouse Habitat Management Areas in the Analysis Area

Habitat Management Area	Description	Percentage of Analysis Area	Percentage of Siting Corridors
Priority	BLM public lands identified as having the highest habitat value for maintaining sustainable greater sage-grouse populations; largely coincide with the USFWS's Priority Areas for Conservation (USFWS 2013).	30%	0%
Important	BLM public land in Idaho that provides a management buffer for and that connect patches of Priority HMAs	7%	0%
General	BLM public land with greater sage-grouse habitat that is occupied seasonally or year-round and is outside of Priority HMAs; generally characterized by lower quality disturbed or patchy habitat of low lek connectivity (State of Idaho 2021a)	30%	91%
None	Not mapped as a sage-grouse HMA	33%	9%

Note: Management area descriptions from BLM (2015a).

Table 3.3-8. Mapped Greater Sage-grouse Seasonal Use Areas in the Analysis Area and Siting Corridors

HAF Fine-Scale Unit	Total Unit Acres	Spring SUA Acres (% of unit)	Summer SUA Acres (% of unit)	Winter SUA Acres (% of unit)
Timmerman Hills	1,277,840	411,285 (32%)	429,183 (34%)	562,655 (44%)
Craters of the Moon	861,774	435,295 (51%)	475,714 (55%)	582,466 (68%)
Total analysis area	**2,139,614**	**846,580 (40%)**	**904,897 (42%)**	**1,145,121 (54%)**
Alternative B siting corridors*	84,051	11,242 (13%)	15,553 (18%)	26,685 (32%)

* Acres for the siting corridors are accounted for in the HAF fine-scale units and do not contribute to the total. Additionally, SUAs overlap and thus do not sum to the total unit acres.

The BLM assessed habitat quality for the Desert mid-scale and Timmerman Hills and Craters of the Moon HAF (fine-scale) units, which are part of the Snake, Salmon, and Beaverhead greater sage-grouse population identified by the USFWS in 2015 (BLM 2018a, 2020). These reports include summarizations of mid-scale (landscape scale or population-level scale) and fine-scale habitat (home range scale). The suitable habitat identified in these reports was delineated by IDFG using telemetry locations and environmental variables. The Desert mid-scale habitat was assessed as marginal; only 63% of the occupied habitat (sagebrush habitat known to be used by greater sage-grouse within the last 10 years; Stiver et al. 2015) assessed was suitable, and the population was isolated. The assessment concluded that the area has the potential to support 50% more sagebrush than currently exists on the ground. The occupied habitat patches were large, but only 26% of the patches were occupied, and there were large distances between them; the linkage areas connecting seasonal habitats were 75% marginal or unsuitable. Patch connectivity was marginal: the mean distance between patches (roughly 50 feet) was twice that found in the two adjacent mid-scale areas. The Desert mid-scale was ranked suitable regarding anthropogenic disturbance because within habitat patches, disturbance is low (BLM 2020).

The Craters of the Moon fine-scale habitat and seasonal habitat availability was rated as marginal with 55% characterized as occupied and suitable (BLM 2020). Wildfire has altered the landscape and removed large portions of mature sagebrush cover (BLM 2020, 2022) and has limited the amount of seasonal habitat and connectivity in this area. Anthropogenic disturbance was present but limited and most common in the southern portion of the HAF unit. This disturbance was considered to be at a very low level at the time of this report. Connectivity between SUAs was marginal. Site-scale habitat suitability for

SUAs is summarized in Table 3.3-9. Areas in this fine-scale unit that were assessed as unsuitable habitat were unsuitable due to a lack of sagebrush (BLM 2020).

Table 3.3-9. Greater Sage-grouse Site-Scale Habitat Suitability in the Analysis Area

HAF Fine-Scale Unit	General Rating and Occupancy	Occupied Habitat % Suitable Spring SUA	Occupied Habitat % Suitable Summer SUA	Occupied Habitat % Suitable Winter SUA
Timmerman Hills	Marginal 38% occupied	90%	87%	80%
Craters of the Moon	Marginal 55% occupied	66%	59%	55%

Source: BLM (2020).

The Timmerman Hills fine-scale habitat was rated as marginal and composed of 37% SUAs and 63% not containing SUAs. However, habitat availability within the SUAs was high at 90%, 87%, and 80% in spring, summer, and winter SUAs, respectively. Connectivity between SUAs was suitable (providing resources for multiple life stages over a majority of the fine-scale area) with much overlap between SUAs. Anthropogenic disturbance was rated as marginal with low density of point features (< 0.00006 sites/square mile) within SUAs. However, linear features were relatively dense at 0.47 mile per square mile, especially in unoccupied habitats. Site-scale habitat suitability for SUAs is summarized in Table 3.3-9. Areas in this fine-scale unit were assessed as unsuitable habitat mainly due to insufficient sagebrush cover and height (BLM 2020). In summary, even though less than half of the Timmerman Hills HAF unit is designated as sage-grouse SUAs, the SUAs that are in this HAF unit are highly suitable and important for sage-grouse. However, all of the spring and summer SUAs and most of the winter SUAs are north of the project area (BLM 2018a).

3.3.4.1.2 SAGE-GROUSE POPULATION AND DISTRIBUTION

Greater sage-grouse is a BLM special-status species (Timmer 2023). Because of declining populations, the species was under consideration by the USFWS for protection under the ESA in 2005 (USFWS 2005) and again in 2010 (USFWS 2010), which prompted an increase in conservation efforts by state and federal agencies and other partners. In 2015, the USFWS determined that these efforts had been adequate to conserve this species and its habitat and that listing the species under the ESA was not warranted (USFWS 2015). Sage-grouse populations in Idaho are currently managed by IDFG, and sage-grouse habitat on public lands managed by BLM is currently managed under BLM (2015a). Sage-grouse have demonstrated population declines in many parts of their range over the past 3 to 5 decades (Coates et al. 2021). The primary factors contributing to these declines are loss, deterioration, and fragmentation of sagebrush habitat (Connelly and Braun 1997; Idaho Sage-grouse Advisory Committee 2006), especially due to wildfire (BLM 2020, 2022); conversion to agriculture; invasion of nonnative, annual grasses; energy and housing development; and sagebrush control (USFWS 2013). Some population declines have been attributed to construction, operation, and maintenance of anthropogenic infrastructure used in energy development (Kohl et al. 2019; USFWS 2013).

Sage-grouse have experienced a 2.9% annual average decline range-wide dating back to the 1960s (Coates et al. 2023). This decline varied among subpopulations. Coates et al. (2021) developed a tool to assess range-wide sage-grouse population trends and to assess various smaller spatial scales for each state within the sage-grouse distribution. This tool also estimates population trends over multiple temporal scales up to 60 years ago to more recent trends within the past decade. Sage-grouse populations oscillate, with high and low abundances at varying intervals from 6 to 12 years (Row and Fedy 2017), and an average oscillation period of 9.4 years. These oscillations make population estimates sensitive to start and stop dates at which they are measured (Coates et al. 2021). Accounting for these oscillations in abundance and using the low abundances of each cycle as start and stop years allow for more robust population estimates and, in particular, the population lows allow for a more conservative estimate (Coates et al. 2021). The trends estimated by Coates et al. (2023) were based on complete oscillations.

Population trends were estimated at six broad, regional spatial scales within the sage-grouse distribution. These six regions represent sage-grouse populations grouped by habitat within the same climate regimes. Population trends at this scale are important to understand because climate can drive large-scale population trends (Coates et al. 2021). However, trends in these regional groups of populations will be less responsive to management because these are variables that cannot be controlled. Of the six regional groups across the range of sage-grouse, Idaho is part of the Great Basin region. This region exhibited more declining trends in local neighborhood lek clusters than the other five regions. This means that the trends for neighborhood lek clusters within this region more frequently displayed larger declines than the average broadscale trend for the entire region. Coates et al. (2021) suggest this behavior could be due to more disturbance to the habitat in this region from the invasive grasses/wildfire cycle that threatens so much habitat in this area. Ricca and Coates (2020) suggest the vast spatial extent of wildfire and subsequent transitions to annual grasslands across much of this region may outpace restoration efforts, especially considering slower sagebrush recovery processes that do not keep pace with sage-grouse declines.

As of 2019, Idaho represented 19% of the leks in this range-wide database tool used to estimate these population trends. A population rate of change of 1.0 means the population was stable, above 1.0 was increasing, and below 1.0 was declining. As of 2019, the estimated average annual finite rate of population change for all sage-grouse lek clusters in Idaho during the most recent population cycle (past 6 to 12 years) was 0.963, indicating a decline. This estimate has not been updated through 2023. The finest spatial scale at which this tool estimated trends is at the local “neighborhood” scale, which is defined as the smallest group of leks that could represent a closed population unit with a 15-km inter-lek movement threshold. The siting corridors coincide with two neighborhoods of leks, one each on the eastern and western portions of the siting corridors. As of 2023, the trend in this neighborhood lek cluster indicates that this neighborhood lek cluster was in decline during the most recent oscillation of 6 to 12 years (estimated average annual finite rate of population change = 0.940). The trend for this neighborhood lek cluster has oscillated between decline and stability, with the long-term trend estimated over the last six oscillations at 0.985, 0.994 over the last five oscillations, 1.002 over the last four oscillations, 1.002 over the last three oscillations, and 0.986 over the last two oscillations. As of 2023, the trend for the western neighborhood lek cluster indicates a decline during the most recent oscillation (estimated average annual finite rate of population change = 0.946). The lek cluster in this neighborhood has consistently declined over all temporal scales with the long-term trend estimated over the last six oscillations at 0.974, 0.976 over the last five oscillations, 0.975 over the last four oscillations, 0.981 over the last three oscillations, and 0.966 over the last two oscillations.

Populations across Idaho have been consistently below the 2011 baseline in Idaho, and these declines tripped adaptive management population triggers in Important HMAs (since 2018) and Priority HMAs (since 2019) in the Desert mid-scale area that are currently operational (i.e., the populations have not increased to the 2011 baseline or above, and the triggers cannot yet be removed; IDFG 2023b). Lek counts in the BLM’s Desert mid-scale area (i.e., the analysis area) are currently 45% and 37% below the 2011 Priority and Important HMAs, respectively (IDFG 2023b). Lek counts in Priority HMAs in the Desert mid-scale area were higher than counts in 2021 and 2022, and counts in Important HMAs in the Desert mid-scale area were higher than counts in 2021 but lower than counts in 2022. The population in this area experienced considerable habitat loss to croplands from 1960 to 1980 and is still experiencing small declines due to energy and housing development, sagebrush control, wildfire, and conversion to cropland (as described in Section 3.3.4.1.1 [Sage-grouse Habitat]).

Based on a desktop habitat assessment (WEST 2020) and preliminary consultation with IDFG, WEST identified areas for aerial and ground lek surveys within 6 miles of the siting corridors to check known occupied lek locations and to identify new lek locations (WEST 2021). BLM (2015a) defines *occupied* leks as leks that have been active during at least one breeding season within the prior 5 years, and *unoccupied* leks as those that have not been active for 5 consecutive years. WEST surveyed areas that were identified as suitable habitat in their desktop habitat analysis in collaboration with IDFG; not all areas affected by the siting corridors were surveyed because some were identified as unsuitable habitat. No new lek locations were identified during aerial surveys in these areas. Three known occupied leks within 6 miles of the siting corridors (4L160, 4L159, and 4L152) were checked in March and April 2020 and 2021, and displaying males were confirmed at leks 4L152 and 4L159 in 2020 (WEST 2020). No males were reported near lek 4L160 in 2020 during WEST surveys, even though they were reported near this lek in 2019 (though it was noted that there were sheep grazing near this lek in 2020 that might have affected activity during surveys). However, the BLM did report actively displaying males on this lek in late March 2020 (WEST 2020). Actively displaying males were confirmed at leks 4L152, 4L159, and 4L160 during each round of surveys in 2021 (WEST 2021). IDFG recorded actively displaying males at these leks in 2022, and at lek 4L159 in 2023 (IDFG 2023a). The presence of suitable habitat indicates that sage-grouse use is likely limited to the eastern and northern portions of the siting corridors (see Figure 3.3-7; Table 3.3-9). The areas identified as sagebrush habitat and the known lek locations were important factors used to help guide project siting and minimization measures (see MVE 2023:C-2 and EIS Appendix 4). However, areas within 6 miles of the siting corridors that were identified as unsuitable were not surveyed by WEST. Prior to project construction, MVE's designated biologist would consult with IDFG for technical assistance and would conduct lek surveys on previously unsurveyed areas identified by MVE as unsuitable habitat (WEST 2021) within 3.1 miles of the siting corridors. These areas would be surveyed by the designated biologist to search for leks that have not yet been identified (see Table App4-4). Required design features (RDFs) (see Table App4-3) and additional compensatory mitigation would be required if new occupied leks are found, in accordance with BLM (2015a).

Attachment 1 in BLM (2023) states the following:

> . . . the determination of which leks are occupied and should be carried forward in NEPA analysis, will be made using the raw count data in light of the 2015 ARMPA definitions, rather than rely on categories designated by IDFG . . .The BLM Idaho State Office will evaluate each Case-by-Case lek with the supporting ecological/environmental information in the BLM Interim Rule Set . . . and determine an *initial* lek status. The *final* status of the Case-by-Case leks will be determined in consultation and coordination between the BLM Idaho State Office and relevant Field Office wildlife biologists. (BLM 2023:Attachment 1, page 2)

In coordination with IDFG, seven of the eight previously *undetermined* leks[5] identified in the draft EIS are now unoccupied and therefore do not warrant further consideration for BLM management. This conclusion is supported by additional lek count data from 2022 and 2023 and the following data: It has been approximately 70 years since sage-grouse were observed displaying in leks 2J010, 2J011, 2J012, 2J013, 2J014, 2J017, and 2J021. These same leks have had three to six repeated counts of zero since 2000; leks 2J012, 2J013, 2J014 also had a count of zero in 1972. In addition, these seven leks occur in a fragmented landscape with little remaining sagebrush cover. In all, 12% to 45% of the area within a 3.1-mile radius of these leks has sagebrush cover greater than 5% (Rigge et al. 2023). Landscape-scale sagebrush cover, proportion of agriculture, and proportion of habitat dominated by annual grass (which affects fire frequency in sage-grouse habitat) are important for lek persistence. Occupied leks typically have more than 40% sagebrush cover within a 3.1-mile radius (Knick et al. 2013). The area around these

[5] Undetermined leks are defined by the IDFG as leks that have not been surveyed or documented as active in the last 5 years, or have insufficient survey information to be designated as unoccupied (IDFG 2023b).

seven leks is also dominated by high annual grass cover within a 3.1-mile radius around the leks, with 24% to 71% of the area having 20% or more annual grass cover. The area within a 3.1-mile radius around leks 2J011, 2J013, 2J014, 2J017, and 2J021 includes 14% to 45% agriculture, which is outside of the normal average for sage-grouse leks across their historic range, as presented in Knick et al. (2013). The area within a 3.1-mile radius around leks 2J010 and 2J012 includes 9% agriculture for each, which is within the normal average. The area within a 3.1-mile radius around leks 2J011, 2J014, 2J017, and 2J021 includes 3% to 5% of developed land, which is also outside of the normal average for sage-grouse leks across their historic range as presented in Knick et al. (2013). The area within a 3.1-mile radius around leks 2J010, 2J012, and 2J013 is within the normal average of 0% to 2%. Since these seven leks have limited sagebrush across the landscape, have high annual grass cover, and are within a landscape further fragmented by agriculture and other land uses, and the leks have had numerous counts of zero over the past 20 plus years, the BLM's independent determination of these seven leks is that they are unoccupied. This is also supported by IDFG definitions of five of these leks as historical, i.e., no lekking activity in the last 20 years, and two leks (2J011, 2J017) do not meet IDFG's definition of a lek, i.e., the lek never had two counts of two or more males within a 10-year period. In summary, none of the previously undetermined leks are active/occupied and thus are not managed under BLM (2015a).

One of the eight previously undetermined leks identified in the draft EIS (4L008) had four counts of zero between 2014 and 2022, and it has been over 40 years since it was occupied. However, lek 4L008 is within 3 and 5 miles of two occupied leks, 4L159 and 4L152, respectively, both with up to 20 birds, and the kernel density, similar to breeding bird density, is medium to high in this area, partly due to several occupied leks to the north and northeast. Kernel density is derived from 1) breeding bird density calculated from the 5-year maximum male count within 10 km of leks with two or more males from 2018 to 2022, and 2) summarizing overlapping 5-year maximum male count values from breeding bird density within 5 km of the aforementioned leks. Habitat characteristics around lek 4L008 are similar to those around leks 4L152 and 4L159. All three of these leks have low landscape sagebrush cover (< 15%) and high annual grass cover (> 40%) due to fires but are within 2 to 3 miles of larger contiguous patches of sagebrush cover. Furthermore, there are telemetry locations around leks 4L152 and 4L159 and to the north of 4L008. Due to the counts and recent change in lek definitions, IDFG no longer considers 4L008 a lek. However, the BLM's independent determination is to consider lek 4L008 as occupied. Because of the proximity and similar characteristics of occupied leks 4L152 and 4L159, kernel density or breeding bird density, and telemetry locations in the area, there is insufficient information for the BLM to consider lek 4L008 as unoccupied under BLM (2015a). Therefore, the BLM would err on the side of caution for sage-grouse conservation and treat lek 4L008 as occupied.

3.3.4.1.3 SAGE-GROUSE MANAGEMENT REQUIREMENTS

Sage-grouse habitat is managed under BLM (2015a), which established RDFs for certain activities in all sage-grouse habitats. One of the requirements is to avoid certain actions within a specified distance of occupied leks (Table 3.3-10). These buffers apply to occupied leks only (they do not apply to leks with other types of status) (BLM 2015a). Applicable RDFs are listed in EIS Appendix 4 (see Table App4-3) and considered as required mitigation measures in this EIS. See Table 3.3-11 for a summary of occupied lek distances from siting corridors within a 6.8-mile buffer of siting corridors.

Table 3.3-10. Greater Sage-grouse Buffer Requirements

Activity	Required Buffer to Occupied Lek (miles)
Linear features (roads), infrastructure related to energy development, surface disturbance	3.10
Tall structures (e.g., communication or transmission structures, transmission lines)	2.00
Low structures (e.g., fences, rangeland structures)	1.20
Noise and related disruptive activities including those that do not result in habitat loss (e.g., motorized recreational events)	0.25

Source: BLM (2015a).

Table 3.3-11. Greater Sage-grouse Leks within 6.8 miles of Alternative B Siting Corridors

Lek ID	Lek Status 2023	Distance to Siting Corridor
4L160	Occupied	1.4 miles 3.1 miles to closest turbine and transmission line 1.7 miles to closest fence 1.5 miles to closest improved existing road 3.1 miles to closest new road
4L152	Occupied	2 miles 3.1–3.5* miles to closest turbine or transmission line 3.1 miles to closest fence 2.0 miles to closest improved existing road 3.1 miles to closest new road
4L159	Occupied	2.9 miles 4.2 miles to closest turbine 3.8 miles to transmission line 3.0 miles to closest fence 2.9 miles to closest improved existing road 3.1 miles to closest new road
4L008	Occupied‡	4.4 mile 7.4–7.5* miles to closest turbine 7.0–7.5* miles to transmission line 4.6 miles to closest fence 4.6 miles to closest improved existing road 6.5 miles to closest new road
4L044	Unoccupied†	6 miles
2J010	Unoccupied†	0.4 mile
2J012	Unoccupied†	0 mile
2J013	Unoccupied†	0 mile
2J014	Unoccupied†	0 mile
2J021	Unoccupied†	0.1 mile

Source: IDFG (2023a)

Notes: 6.8 miles is the distance within which noise may be elevated, as described in EIS Section 3.3.4.2.2 (Impacts), Issue 2.

Occupied (BLM 2015a): A lek that has been active during at least 1 breeding season within the prior 5 years.
Unoccupied (BLM 2015a): A lek that has not been active for five consecutive years. To be designated unoccupied, a lek must be inactive for five consecutive breeding seasons.

Buffers (and thus distances) for fences and infrastructure apply to occupied leks only.

Improved existing road: Refers to ID 24 and existing county roads that are not under the BLM's jurisdiction.

* Range of distances varies by alternative.

† 3 to 6 repeated counts of 0 sage-grouse observed on leks since 2000, including a 0 count in 2018; last birds detected in early to mid-1950s.

3.4 CLIMATE AND GREENHOUSE GASES (SEE APPENDIX 15)

3.5 CULTURAL RESOURCES

3.5.1 Native American Resources

Native American resources, as the term is used in this EIS, refers to 1) cultural resources or artifacts created by Tribes or cultures and to places and landscape features of significance to Tribes, whether or not these resources are subject to the NHPA, ARPA, or NAGPRA, and 2) natural resources (such as plants, animals, and minerals, or geographic features like buttes and caves) that are spiritually and culturally significant to Tribes (including cairns, stone circles, alignments, petroglyphs/pictographs, and rockshelters), and include resources for which Tribes have treaty-protected rights. Impacts to these resources could diminish Tribes' treaty rights or other rights as recognized under the AIRFA and EO 13007 (May 1996: Indian Sacred Sites) and those addressed under Joint Secretarial Order (JSO) 3403 and the *Memorandum of Understanding* (MOU) *Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty Rights and Reserved Rights* (ACHP et al. 2021).

The BLM SFO acknowledges resource concerns expressed by the Tribes and will consider each concern whether under NHPA Sections 106 and 110, AIRFA, EO 13007, NAGPRA, ARPA, NEPA, or other applicable requirements. Within the context of environmental justice, the interests and concerns of Tribes within the analysis area are further described in Section 3.6 (Environmental Justice and Socioeconomics).

AIRFA and EO 13007 apply to Native American resources of religious importance where these resources are located on federal land within the physical and non-physical project APEs. AIRFA protections and EO 13007 stipulations would need to be considered for Native American access to these resources, and EO 13007 stipulations would need to be considered regarding avoiding adversely affecting the physical condition of such sacred sites.

NAGPRA applies to Native American human remains, associated funerary objects, sacred objects, or objects of cultural patrimony where these are identified on federal land within the physical APE or discovered during project construction. Treatment of human remains, funerary objects, sacred objects, and objects of cultural patrimony, should they be discovered at any stage of the project on BLM land, is addressed in the monitoring and discovery plan under the historic properties management plan (HPMP) of the PA, would comply with implementing regulations of NAGPRA (43 CFR 10), and would follow procedures outlined in the BLM Idaho Instruction Memorandum No. ID-2018-015 (BLM 2018). The monitoring and discovery plan also addresses protections for human remains (Native American or other) located on private or state land (Idaho Statute 27-500), should human remains be discovered in these locations as part of the project.

Native American resource concerns for the project in the NHPA Section 106 review pertain especially to a resource's integrity of setting, feeling, or association from a Tribal perspective, even if the project is not directly visible or audible from that resource of concern. Impacts to the NRHP-listed Wilson Butte Cave (10JE6) have specifically been identified by Tribes and other consulting parties to be of heightened concern. Although a 1-mile setback was incorporated into the project design to avoid physical impacts to this significant cultural resource (MVE 2023:C-3.2.2), non-physical visual and auditory impacts would not be fully avoidable by the project. Figure 3.5-1 illustrates the simulated condition for Alternatives B and E (with 6-MW wind turbines) as viewed 2.5 miles to the east from KOP 10 (Wilson Butte Cave), on top of Wilson Butte Cave; however, the nearest turbine siting corridor would be 0.9 mile from Wilson Butte Cave. Native American concerns for project impacts viewed from landform features including other buttes, regardless of whether there are associated archaeological site components, have also been expressed in the NHPA Section 106 consultation. For to-scale simulations and viewing information for visual resources KOPs, including for the BLM's Preferred Alternative from KOPs 1, 2, 10, and 16, please refer to EIS Appendix 5 (Select Visual Resources Simulations) or the project visual resources technical report (SWCA 2024), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). Wilson Butte and Cave, Sid Butte, and other buttes and cultural resources of potential concern to Tribes are within the operational noise zone where project-related noise would occur (SWCA 2022).

Figure 3.5-1. Visual resources KOP 10 (Wilson Butte Cave): simulated panoramic viewing condition, view facing east, under Alternatives B and E (with 6-MW turbines).

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Tribes have noted they would consider the presence of the project on the landscape severely impactful. The Shoshone-Bannock Tribes specifically voiced concerns that the project would impact traditional Tribal resources relating to hunting, gathering, subsistence, and other practices. The Shoshone-Bannock Tribes voiced concerns about severe cultural and spiritual impacts on their members, dark skies concerns related to turbine lighting that would present severe effects to Tribal practices in the area, and concerns for the diminishment of their exercise of Treaty Rights in the area. The Northwestern Band of Shoshone Nation described their specific concerns relating to the impacts to wildlife, to wildlife habitats and corridors, and to migratory birds as they all apply to the rights and trust responsibilities defined in their treaties. Tribes have expressed that they hold wildlife spiritually and culturally significant and that includes everything about the wildlife's lifeways (habitat, migration tendencies, mating, etc.). Vegetation is another aspect of the natural environment Tribes hold spiritually and culturally significant, and wild plants continue to provide a primary source of subsistence for many Tribal members. These resources and associated practices in some cases involve places in which Tribes hold treaty rights, as well as broader areas to which they ascribe cultural significance. Resources of cultural significance may include traditional cultural properties (TCPs) as defined in National Register Bulletin 38 (NPS 1998). Since TCPs are culturally sensitive, they often remain undocumented for confidentiality reasons, and all TCPs known by Tribes in the area may not be identified in the Class I study area (Power Engineers, Inc. [Power] 2021, 2022).

Tribal Treaty Rights span a variety of subjects, including rights reserved by Tribes in relation to natural resources (i.e., subsistence rights and the right to hunt, fish, collect firewood, and gather other materials on land ceded by or land retained by Tribes) (ACHP 2021) (see also 36 CFR 800.2(c)(2)(ii)(B)). Established treaties are binding federal law. Tribal Treaty Rights must be considered in the agency decision-making process, consistent with the federal government's trust responsibility to federally recognized Indian Tribes (ACHP 2021; ACHP et al. 2021).

EO 13175 directs departments to uphold their special trust responsibilities and consult with sovereign Tribal governments. JSO 3403 (Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters) was issued to ensure that the U.S. Department of Agriculture (DOA) and the DOI and their component bureaus and offices are managing federal lands and waters in a manner that seeks to protect the treaty, religious, subsistence, and cultural interests of federally recognized Indian Tribes (DOI 2021). Additionally, ACHP et al. (2021) affirm agency commitments to protect Tribal Treaty Rights, reserved rights, and similar Tribal rights to natural and cultural resources, including during agency decision-making and regulatory processes. Sovereign Tribes may retain many Treaty Rights, which usually include use and access to resources beyond their current land holdings. The Treaty of Soda Springs, October 14, 1863 (unratified) established a reservation of over 44 million acres for the Eastern Shoshone and recognized the expansive territories of other Shoshone-Bannock groups that included the area containing the current project (Clayvin B. Herrera v. State of Wyoming [Supreme Court of the United States, No. 17-532]). Following the Bear River Massacre, the Treaty of Box Elder in 1863 also further removed the Northwestern Band of the Shoshone Nation from two-thirds of their traditional hunting grounds, reserving lands for them in Idaho between Raft River and the Portneuf Range, until they were resettled in Utah or in other areas like the Fort Hall Reservation in the 1870s (*Indian Country Today* 2018). The Fort Bridger Treaty of 1868 was ratified by the U.S. Congress and limited Shoshone-Bannock Tribes' lands in Idaho to the Fort Hall Reservation (Shoshone-Bannock Tribes 2021). One of the provisions of the Fort Bridger Treaty of 1868 was that Shoshone people could hunt off the reservation on "unoccupied lands of the United States so long as game may be found thereon" (Shoshone-Bannock Tribes 2021). The Duck Valley Reservation was set in Idaho and extended into Nevada for the Shoshone-Paiute Tribes by presidential order in 1877. Additionally, the Ruby Valley Treaty of the Shoshone-Paiute Tribes recognizes certain Shoshone-Paiute lands in Nevada (Oklahoma State University 2023).

The Shoshone-Bannock Tribes have provided the following statement regarding their Treaty Rights and connection to the land at the project area:

> The various bands of the Shoshone and Bannock people traditionally roamed extensively throughout the Great Basin and Intermountain region; with specific bands occupying the landscapes of the Snake River Plains and surrounding mountains from time immemorial. Prior to non-Indian settlers entry into the region, Indians utilized the rich natural resources, and enjoyed the cultural traditions and lifestyles unique to our people. The Tribes called their aboriginal territory, "bia sokoppe" the Shoshoni term referring to Mother Earth, or literally, "our big lands". The removal of our people to reservations remains a dark moment in our history, with generations carrying on stories of our homelands. In June 1867, an Executive Order established the Fort Hall Indian Reservation, as a collective place to consolidate the various bands of Shoshones and Bannocks, from their aboriginal lands, clearing the way for European-American settlements, such as ranchers and miners who desired rich resources present on aboriginal lands. The United States then signed a treaty, the Treaty with the Eastern Shoshone and Bannock Indians in 1868 (commonly referred to as the "Fort Bridger Treaty"), to protect our subsistence rights to harvest foods, medicine, and materials from our homelands. This document established a political entity we now refer to as the Shoshone-Bannock Tribes (Tribes) who are the stewards of the unique culture, homelands, and practices of our people from time immemorial. The 1868 Fort Bridger Treaty (15 Stat 673) affirmed the reservation reserved by Executive Order in 1867 and reserved certain off-reservation use rights for the Tribes. Article IV states: The Indians herein named agree, when the agency-house and other buildings shall be constructed on their reservations named, they will make said reservations their permanent home, and they will make no permanent settlement elsewhere; but they shall have the right to hunt on the unoccupied lands of the United States so long as game may be found thereon, and so long as peace subsists among the whites and Indians on the borders of the hunting districts. In addition to the reserved rights to 'hunt' for our subsistence foods on the unoccupied lands of the United States, the Shoshone-Bannock Tribes specifically reserved land rights in the 'Camas Prairie' region of central Idaho. Due to a scribe's error, the Camas Prairie was never designated by the US government as a component of our reservation, the first of many broken Treaty promises across our lands. Our cultural connection has never been severed, and the region this project is located on is one of the richest cultural landscapes for our people that remains in the area. (EIS Appendix 14:Comment ID13009-9)

3.5.2 Minidoka War Relocation Center and Minidoka National Historic Site

Additional background information for this section can be reviewed in Section 3.20, Minidoka War Relocation Center and Minidoka National Historic Site.

3.6 ENVIRONMENTAL JUSTICE AND SOCIOECONOMICS

3.6.1 Environmental Justice Communities

3.6.1.1 Affected Environment

Consideration of environmental justice issues is mandated by EO 12898, which was published on February 11, 1994. Environmental justice is the fair treatment and meaningful involvement of all potentially affected people, regardless of race, color, national origin, or income, when the federal government develops, implements, and enforces environmental laws, regulations, and policies, such as the review of the project (BLM 2022a). Environmental justice populations—low-income, minority, Tribal populations, and dispersed environmental justice communities (Japanese American and Minidoka-connected communities and Native American Tribes)—who reside within the analysis area or would otherwise be affected by the Lava Ridge Wind Project are identified in the sections below.

3.6.1.1.1 LOW-INCOME, MINORITY, AND TRIBAL POPULATIONS

The CEQ has developed guidance to assist federal agencies with their NEPA procedures so that environmental justice concerns are effectively identified and addressed. The guidance focuses on identifying minority and low-income environmental justice populations using census data. The BLM's Instruction Memorandum 2022-059 (Environmental Justice Implementation) issued on September 20, 2022, builds upon the CEQ's guidance and provides further direction for considering environmental justice concerns in BLM-prepared NEPA documents, including a detailed framework for identifying environmental justice populations using census data as well as several other recommended data sources (BLM 2022a).

The BLM defines *low-income* populations as individuals or groups of people whose income is less than or equal to twice (200% of) the federal poverty threshold, as identified by the U.S. Census Bureau (BLM 2022b). Low-income populations are considered environmental justice populations when the percentage of the analysis area population that is low income meets or exceeds 50% of the analysis area population or when it is greater than or equal to that of the reference population.

Minority populations include the following population groups: American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, Black or African American, some other race (other than White), a combination of two or more races, or Hispanic (BLM 2022b; CEQ 1997). Except for White non-Hispanics, all other racial and ethnic groups are considered minorities; therefore, the total minority population of an area is calculated by subtracting the White non-Hispanic population from the total population (BLM 2022b). Minority populations are considered environmental justice populations when the percentage of the analysis area population that constitutes a minority meets or exceeds 50% or when it is meaningfully greater than the reference population. The BLM generally defines *meaningfully greater* as meeting or exceeding 110% of the reference community population (BLM 2022b).

Members of Tribal populations include all persons having origins in any of the original peoples of North America and South America (including Central America) and who maintain Tribal affiliation or community attachment. Any American Indian or Alaska Native population qualifies as a Tribal population, and membership in a federally recognized Tribe is not required (BLM 2022b). Tribal populations are considered environmental justice populations when the percentage of the analysis area population that constitutes a Tribal population is greater than or equal to that of the reference population.

As of 2021, the total population for the analysis area was 179,677 (U.S. Census Bureau 2022). Based on a review of census data for all counties, census tracts, and block groups within the analysis area, multiple environmental justice populations exist within the analysis area (U.S. Census Bureau 2022). More than half of all census tracts (62%) and block groups (54%) in the analysis area are low-income environmental justice populations, and approximately one third of all census tracts (33%) and block groups (41%) are minority environmental justice populations. Tribal environmental justice populations, which were only identified at the census tract level, occur within over one third of all census tracts (38%). When combined, 82% of all census tracts and 68% of all block groups in the analysis area qualify as one or more type of environmental justice populations (e.g., low income, minority, and/or Tribal). Most of the siting corridors occur within an environmental justice community, whereas the areas adjacent to and surrounding the siting corridors are a mixture of environmental justice and non–environmental justice communities. Of the identified environmental justice communities, four block groups and four census tracts directly intersect the siting corridors and haul routes, and the remainder are not directly intersected by the siting corridors but could be subject to indirect effects.

Figure 3.6-1 shows the locations of low-income and minority environmental justice populations within the analysis area. Environmental justice populations are shown in Figure 3.6-1 at the scale of block groups because this represents the smallest and most targeted spatial scale for identifying low-income and minority populations. The environmental justice block groups shown in Figure 3.6-1 were identified as either a low-income population, minority population, or both. Figure 3.6-2 shows the locations of Tribal environmental justice populations within the analysis area. Tribal populations were identified, and are shown, at the larger scale of census tracts due to the low number of individuals within the Native American and Alaska Native category at the block group level.

Minority groups that are most prevalent in the identified environmental justice populations include Hispanic or Latino, two or more races, and some other race. Additionally, although the American Indian and Alaska Native, Black or African American, and Asian populations make up a small percentage of the total population for individual census tracts and block groups (generally less than approximately 5%), they meet or exceed that of the reference population within many of the identified environmental justice communities.

Given the rural and agricultural setting of the analysis area, the majority of minority, low-income, and Tribal environmental justice populations reside within small towns or cities evenly distributed throughout the analysis area, with some scattered residences in surrounding farmland and rangeland. Environmental justice communities (either unincorporated and incorporated) that are present within the analysis area include Shoshone, Heyburn, Acequia, Oakley, Rogerson, Dietrich, Bliss, Wendell, Deep Creek, Castleford, Amsterdam, Hollister, Clover, Fairview, Appleton, Hunt, Hazelton, McHenry, Greenwood, Minidoka, Jackson, Declo, Albion, Idahome, Malta, Elba, Almo, Sublett, Ruby, Paul, Hobson, Milner, Murtaugh, Hansen, Basin, and Kimberly. In addition, portions of Gooding, Hagerman, Buhl, Jerome, Rupert, Burley, Twin Falls, Curry, and Filer also occur within the identified low-income and minority environmental justice block groups.

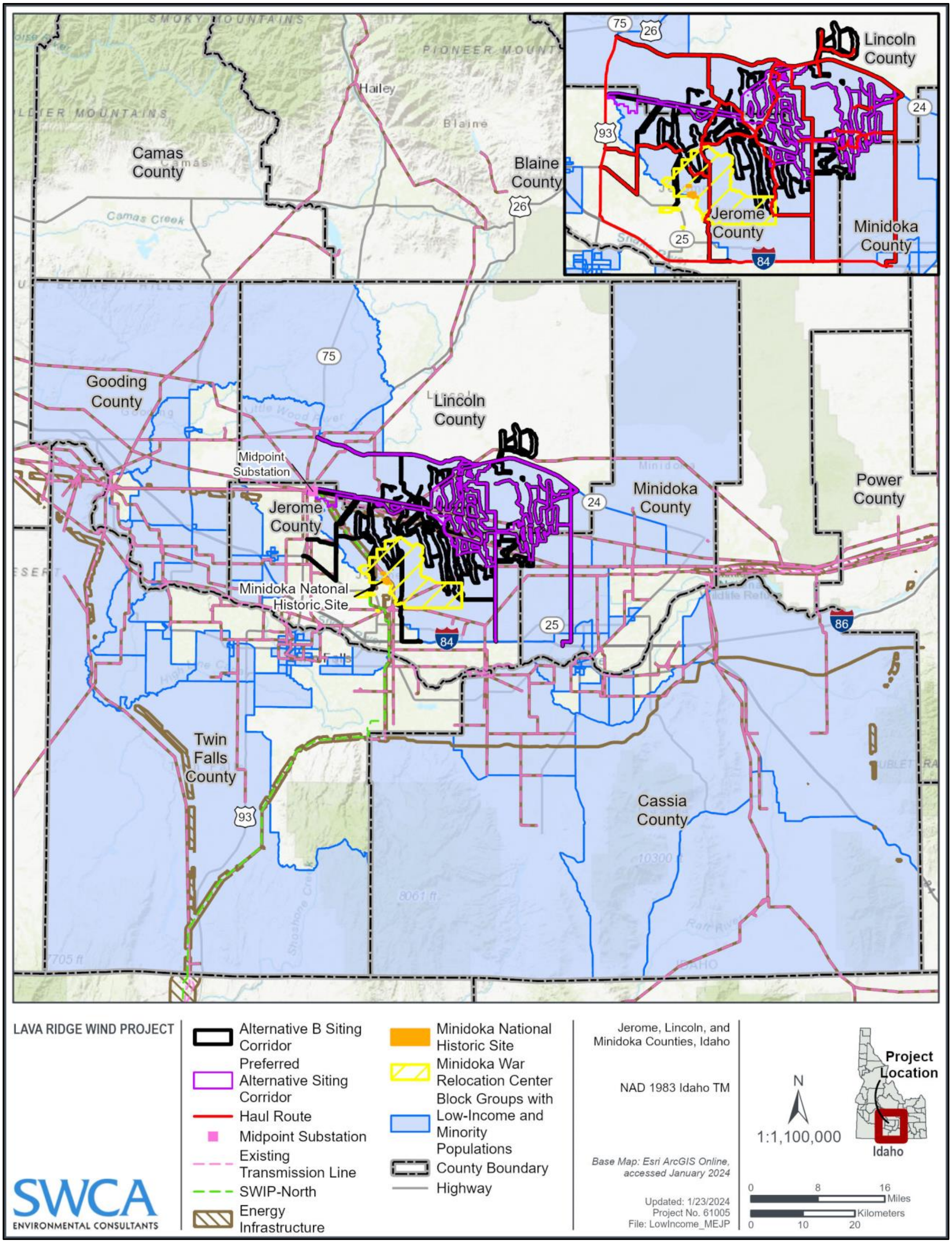

Figure 3.6-1. Block groups with low-income and minority environmental justice populations within the analysis area.

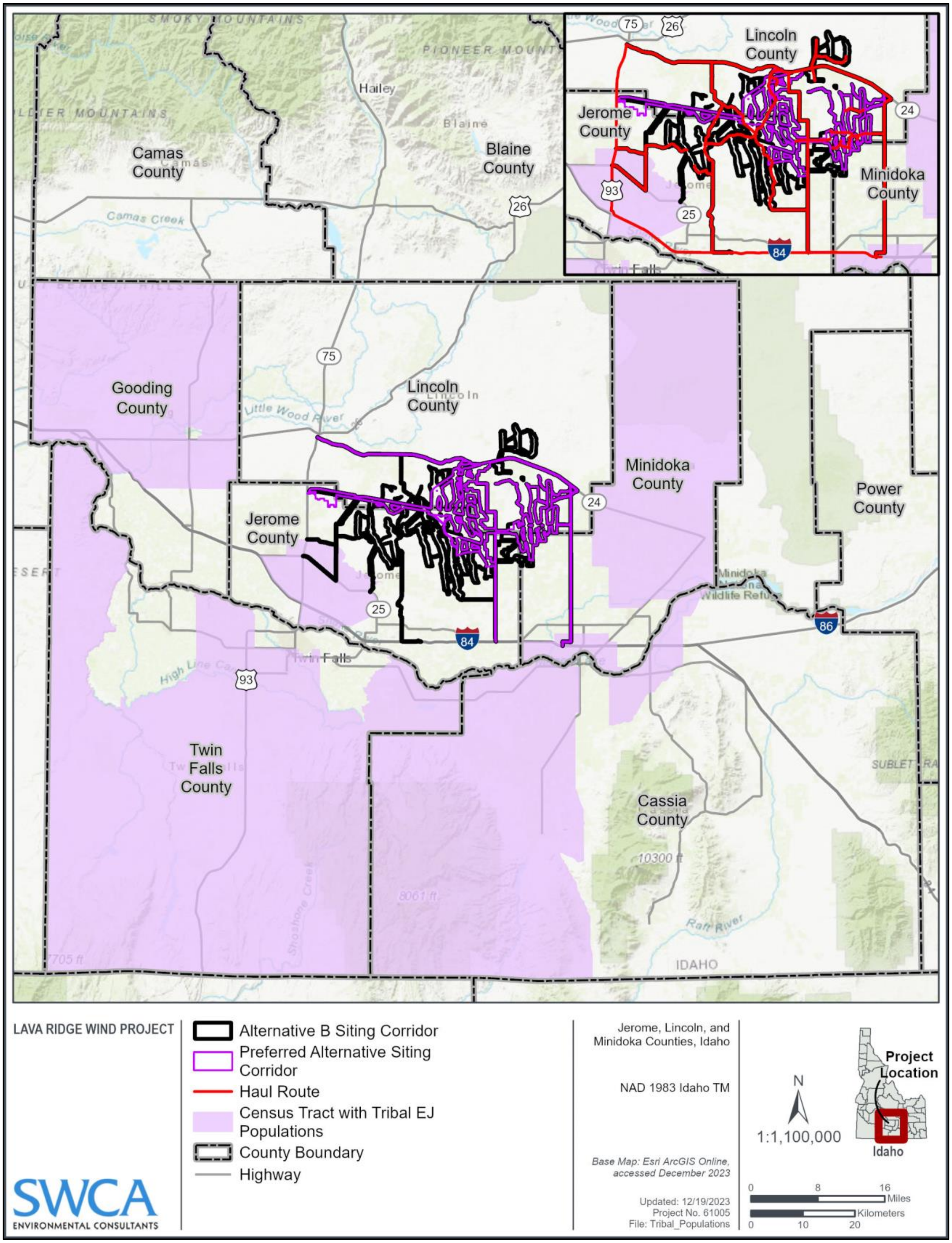

Figure 3.6-2. Census tracts with Tribal environmental justice populations in the analysis area.

3.6.1.1.2 DISPERSED ENVIRONMENTAL JUSTICE POPULATIONS

As described in BLM (2022a), geographically dispersed environmental justice populations who do not reside in the analysis area can still be affected by actions on BLM public land if those populations use or depend on resources in the analysis area. Dispersed environmental justice populations should therefore be considered in environmental justice analyses. Through scoping, two additional dispersed environmental justice populations were identified: 1) the Japanese American and Minidoka-connected communities, which have interests and concerns associated with Minidoka NHS and the area encompassing the historic Minidoka WRC[6], and 2) Tribes, who may not reside within the analysis area but have interests and concerns associated with Native American resources in the analysis area. The interests and concerns of these two dispersed populations regarding resources within the analysis area are summarized below and are further described in Section 3.5 (Cultural Resources) within the context of cultural resources and historic properties.

Japanese American and Minidoka-Connected Communities

The Minidoka NHS (shown on Figures 3.6-1 and 3.6-2) is a WWII–era Japanese American incarceration site and encompasses approximately 388 acres within the larger 34,000-acre Minidoka WRC. The site represents the exclusion and unjust incarceration experience of 13,000 Japanese American citizens and legal residents of Japanese ancestry during WWII. Incarcerees originated from the West Coast states of Washington, Oregon, Alaska, and California. In addition to Japanese Americans, Alaska Native spouses and mixed Alaska Native and Japanese American children were also among those incarcerated (NPS 2007). A small number of incarcerees who were transferred to Minidoka from the Kooskia Internment Camp in north-central Idaho included Japanese Americans from Alaska, Hawaii, Peru, Mexico, and Panama (NPS 2006; Niiya 2023). All Minidoka incarcerees, as well as their descendants, friends, or other people who feel strongly about the injustices associated with the Minidoka site, are part of the broader Minidoka-connected community, regardless of their racial or ethnic identity. The Japanese American and Minidoka-connected communities have more than two generations with cultural identity and traditions around Minidoka NHS.

Minidoka NHS is a member of the International Coalition of Sites of Conscience and is one of two sites in the state of Idaho (International Coalition of Sites of Conscience 2022a). The International Coalition of Sites of Conscience defines a *site of conscience* as “a place of memory – such as a historic site, place-based museum or memorial – that prevents this erasure from happening, to ensure a more just and humane future. Not only do sites of conscience provide safe spaces to remember and preserve even the most traumatic memories, but they enable their visitors to make connections between the past and related contemporary human rights issues” (International Coalition of Sites of Conscience 2022b). The site offers opportunities to make connections between contemporary human rights issues and past injustices inflicted upon Japanese Americans and Minidoka-connected communities during WWII by the federal government. Minidoka NHS is a sacred pilgrimage site for Minidoka survivors, their descendants, their friends, and others who care deeply about these injustices (see Tables A-1 and A-2 in EIS Appendix 14), with organized commemorative events happening at Minidoka NHS since 1979. As stated in the Minidoka NHS foundation document (NPS 2016), “commemoration and healing” and “public understanding, education, and involvement” are fundamental values of Minidoka NHS. Minidoka NHS is a member of the International Coalition of Sites of Conscience and is one of two sites in the state of Idaho (International Coalition of Sites of Conscience 2022a). The International Coalition of Sites of Conscience defines a *site of conscience* as “a place of memory – such as a historic site, place-based museum or memorial – that prevents this erasure from happening, to ensure a more just and humane future. Not only

[6] Additional background information can be reviewed in Section 3.20 (Minidoka War Relocation Center and Minidoka National Historic Site).

do sites of conscience provide safe spaces to remember and preserve even the most traumatic memories, but they enable their visitors to make connections between the past and related contemporary human rights issues" (International Coalition of Sites of Conscience 2022b).

Japanese American and Minidoka-connected communities have endured long-term and intergenerational psychological impacts of incarceration in the form of post-traumatic stress; ethno-racial stigma and discrimination; weakened cultural ties; lingering economic effects; and lingering feelings of guilt, shame, anger, or injustice (Iwamura 2007; Nagata and Patel 2021). Those who were incarcerated suffered tremendous economic losses from the forced closure of businesses and consolidation of property and belongings to "only what they could carry without knowing where they were going or for how long" (NPS 2006:15), which has had lasting negative effects on intergenerational wealth and is one of many factors contributing to the long-term and intergenerational psychological impacts of incarceration (Nagata and Patel 2021). The Minidoka NHS offers opportunities for members of the Japanese American and Minidoka-connected communities to heal from their traumas through pilgrimages and other types of sacred rituals and practices (Iwamura 2007).

The landscape setting and character of Minidoka NHS and Minidoka WRC are key components of the visitor and survivor experience of remoteness, isolation, abandonment, and injustice for those who were incarcerated at the site. Specifically, visitors and survivors highly value their ability to experience the wide-open views of the landscape and the nightscapes as would have been experienced by incarcerated Japanese Americans at the time of Minidoka WRC incarceration. In addition, the auditory environment is also a critical component of the visitor and survivor experience. As described in the Noise section at EIS Section 3.6.1.1.2, existing noise levels (including the average existing sound level with the influence of humanmade sounds) at Minidoka NHS were modeled by NPS in 2015 and are predicted to be approximately 32 dBA or 6.0 dBA above the natural ambient sound level (approximately 26 dBA; this includes noise generated from natural sources only) (NPS 2015).

The Scoping section in EIS Appendix 10 summarizes the BLM's ongoing efforts to engage with the Japanese American and Minidoka-connected communities.

Native American Tribes

Native American resources of concern generally occur throughout the analysis area and may include cultural resources containing artifacts or features; human remains and funerary objects; TCPs and other Tribal sacred places and sensitive areas; Tribal resources relating to hunting, gathering, and subsistence and other practices; and traditional use areas related to vegetation, wildlife, or other natural resources. Native American resources of concern include those considered sacred and that carry cultural, religious, and spiritual importance for Tribes and, as well as those that provide a primary source of subsistence for Tribal members. Tribes also have treaty-protected rights to access resources of religious importance that are 1) located on federal land, as recognized under the American Indian Religious Freedom Act (AIRFA) (36 CFR 800.3(b)) and EO 13007 (May 1996: Indian Sacred Sites) and 2) addressed under Joint Secretarial Order (JSO) 3403 and the *Memorandum of Understanding* (MOU) *Regarding Interagency Coordination and Collaboration for the Protection of Tribal Treaty Rights and Reserved Rights* (ACHP et al. 2021). Section 3.5 (Cultural Resources) includes a more detailed description of 1) Native American resources of concern that have been identified through initial project scoping and NHPA Section 106 consultation with Tribes and 2) Tribal Treaties memorializing rights potentially relevant to the siting corridors. Additional resources may be identified throughout the process of Government-to-Government consultation or could be discovered during project construction. The BLM SFO will consider resource concerns expressed by the Tribes under NHPA Sections 106 and 110, AIRFA, EO 13007, NAGPRA, ARPA, NEPA, or other applicable requirements.

The BLM contacted the following Tribes to provide information on the project, the NHPA Section 106 process, and to inquire about engaging in future consultations: the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation (Shoshone-Paiute Tribes); the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation (Shoshone-Bannock Tribes); the Northwestern Band of the Shoshone Nation; the Nez Perce Tribe of Idaho; the Te-Moak Tribe of Western Shoshone including the Battle Mountain Band, the Elko Band, the South Fork Band, and the Wells Band; and the Confederated Tribes of the Goshute Reservation. EIS Appendix 10 contains information regarding Section 106 consultation and the BLM's Government-to-Government consultation with Tribes.

3.6.2 Community Services, Employment, and Housing Availability (see Appendix 15)

3.6.3 Local and Regional Economy (see Appendix 15)

3.7 FIRE AND FUELS MANAGEMENT (SEE APPENDIX 15)

3.8 LAND USE AND REALTY (SEE APPENDIX 15)

3.9 LIVESTOCK GRAZING (SEE APPENDIX 15)

3.10 PALEONTOLOGICAL RESOURCES (SEE APPENDIX 15)

3.11 POLLINATORS AND INSECTS (SEE APPENDIX 15)

3.12 RECREATION (SEE APPENDIX 15)

3.13 SOILS (SEE APPENDIX 15)

3.14 TRANSPORTATION (SEE APPENDIX 15)

3.15 VEGETATION (SEE APPENDIX 15)

3.16 VISUAL RESOURCES

3.16.1 Landscape Character and Scenic Quality

3.16.1.1 Affected Environment

The analysis area is within the Snake River Plain section of the Columbia Plateau physiographic region, which is characterized by a volcanic plateau with sediment deposits as a result of the Snake River floodplain (Fenneman 1931). The valley and plain landscapes of the analysis area are dominated by sagebrush steppe but also include irrigated agriculture and development (McGrath et al. 2002). The topography of the analysis area is relatively flat, with elevations ranging from approximately 3,200 feet to approximately 5,900 feet north of the siting corridors.

The existing visual conditions (i.e., values) that relate to landscape components, both natural and humanmade, contribute to the overall visual character associated with an area of land and are expressed through the BLM VRI process. The information collected during the VRI process provides descriptions and analysis of the landscape and viewer sensitivity associated with a project and is broken down into three categories: scenic quality, visual sensitivity, and distance zones (BLM 1986a). The VRI process and components, including the combined VRI, are presented in Figures 3.16-1–3.16-4 and described in SWCA (2024). The scenic quality and landscape character of the analysis area are also described below.

3.16.1.1.1 LANDSCAPE CHARACTER AND SCENIC QUALITY

The relative scenic quality (A, B, or C) was assigned to landscape units, or SQRUs, in the analysis area by rating the scenic quality evaluation key factors of landform, vegetation, water, color, adjacent scenery, scarcity, and cultural (humanmade) modifications (BLM 1986c). Scenic quality ratings of the analysis area are shown in Figure 3.16-1 (see additional details in SWCA [2024]).

Areas with a scenic quality rating of A (areas of greater visual variety based on the seven factors described above) are in the northeastern and eastern portions of the analysis area, and areas with a rating of B (lesser visual variety than scenic quality A landscapes) are in the northern and southeastern portions of the analysis area. The siting corridors are in an area with a scenic quality rating of C (lesser visual variety than scenic quality B landscapes). Common traits for the siting corridors include a generally flat plain, with a subtle slope and soft undulations from north to south with broad, distant views of surrounding mountain ranges. Vegetation is a mix of sagebrush and low grasses and also contains developed agricultural fields and domestic vegetation species, which add seasonal color and texture variety throughout. The siting corridors contain a mix of urban development, agricultural development, transmission lines, substations, and farming infrastructure, which, when combined, add discordant elements within the natural landscape. The eastern portion of the siting corridors is characterized by rock outcroppings and buttes, which are distinctive in this area.

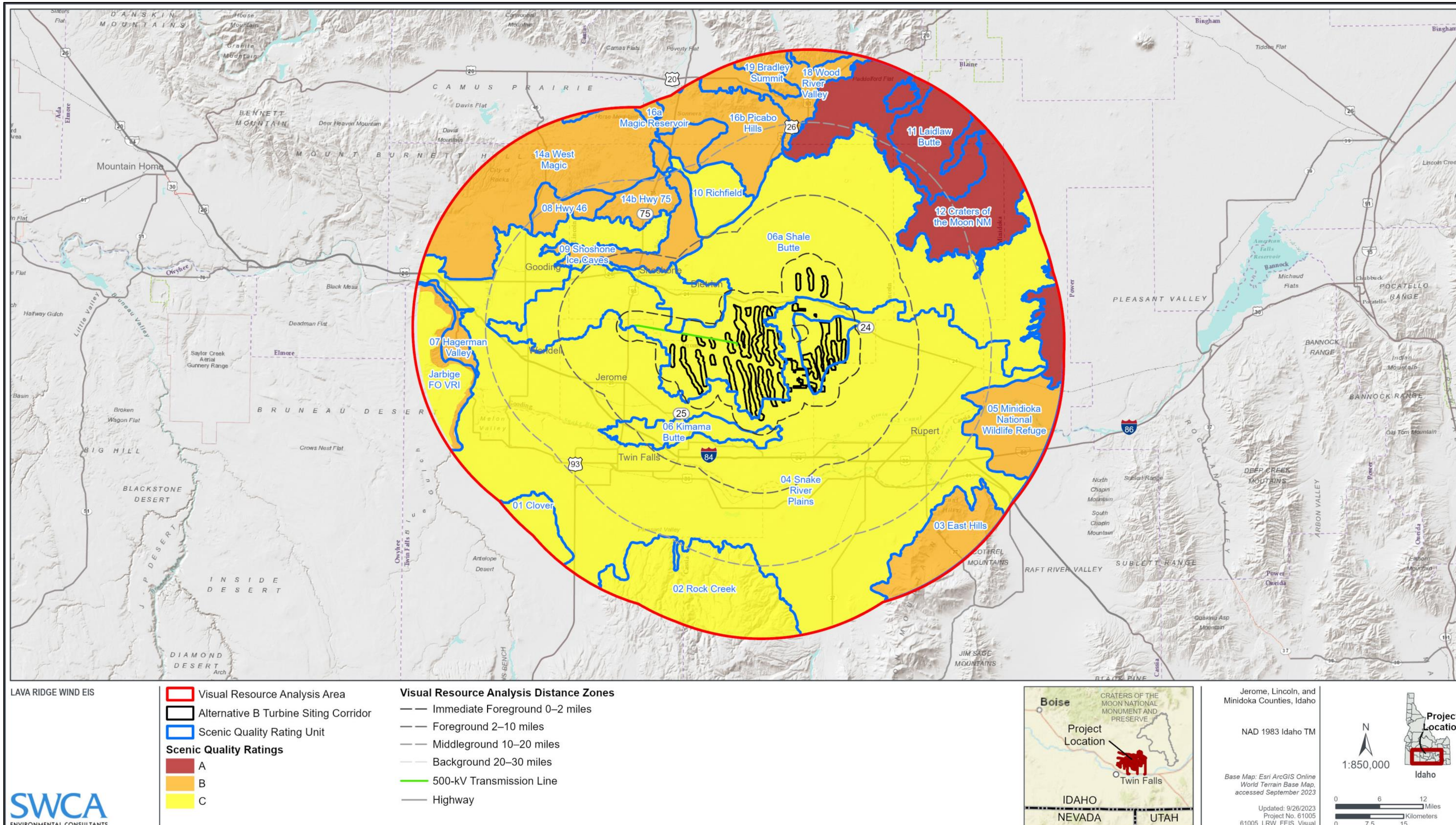

Figure 3.16-1. Scenic quality ratings in the visual resource analysis area.

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3.16.1.1.2 KEY OBSERVATION POINTS

Visual sensitivity level rating units (SLRU) reflect attitudes and perceptions held by people regarding the landscape and, in general, reflects the public's level of sensitivity for noticeable change to the landscape. Visual sensitivity is often used to select KOPs. Visual sensitivity ratings range from high sensitivity (i.e., public is highly aware of incremental changes in the subject landscape) to low sensitivity (i.e., public has little concern with changes in the subject landscape). The siting corridors are in an area of moderate sensitivity. Figure 3.16-2 illustrates the visual sensitivity ratings for the analysis area (see additional details in SWCA [2024]).

KOPs are locations where the public could see the project both from a stationary (e.g., residential area) or a linear (e.g., major roadway) location. KOPs for this analysis were identified based on a review of aerial photography and topographic maps, coordination with BLM SFO staff and cooperating agencies, and field investigations (SWCA 2024). The identified KOPs are described in Table 3.16-1 and are shown in Figure 3.16-3. Potential changes in the viewshed are evaluated from these identified KOPs. Sensitive viewer groups who could see the project from KOPs are as follows:

- Travelers: Travelers that use roadways from which the landscape is viewed.
- Visitors: People visiting from outside the analysis area to engage with the landscape. These could also include residents.
- Residents: People who live and work in the analysis area. People who view the landscape from their properties and homes and often from places of employment while engaged in daily activities.

Photographs and project simulations from several KOPs (KOPs 1, 2, and 10) are included in EIS Appendix 5 (Select Visual Resources Simulations).

Distance zones used in this section describe the relative distance from project components that are highly visible, such as transmission lines and turbines (or turbine corridors). For this analysis, these zones are shown on Figure 3.16-3 and described as follows:

- Immediate foreground: 2 miles from project components
- Foreground: 2 to 10 miles from project components
- Middleground: 10 to 20 miles from project components
- Background: 20 to 30 miles from project components

The visibility of the project at increased distances is most often associated with the blade tips (rotation) while the overall turbine structure would be discernable but not detailed.

The KOPs that were selected to represent viewer experience at Minidoka NHS[7] Visitor Center (KOP 1), Block 22 Barracks (KOP 2), and the Honor Roll (KOP 16) are the same distance from the closest visible project component (approximately 1.7 miles). However, KOP 2 is identified as being 5 miles from the closest visible project component (see Table 3.16-1) rather than 1.7 miles, and KOP 16 is identified as being 5.5 miles. This differentiation in distance between KOP 1 and KOPs 2 and 16 reflects the specific viewing direction and area of focus from the viewer location to the closest visible turbine corridor, as shown in the simulations (see EIS Appendix 5 and Appendix C in SWCA [2024]). For KOP 2, the viewer's area of focus is the Block 22 Barracks and the nearest visible turbine corridor within this focused

[7] Additional background information can be reviewed in Section 3.20 (Minidoka War Relocation Center and Minidoka National Historic Site).

view of the Barracks occurs 5 miles away; this would be similar for KOP 16. There are peripheral views of other visible turbine corridors that occur approximately 1.7 miles to the north from KOP 2. The resulting peripheral views of these turbines may attract attention but would not be the primary focus of attention for viewers.

Table 3.16-1. Key Observation Points in the Visual Resource Analysis Area

KOP Number	KOP Name	Sensitive Viewer Group	Approximate Distance to Nearest Siting Corridor Based on Viewer Orientation* (miles) Distance Zone
1	Minidoka NHS – Visitor Center 10:05am	Visitors†	1.7 Immediate foreground
1	Minidoka NHS – Visitor Center 3:55pm	Visitors†	1.7 Immediate foreground
2	Minidoka NHS – Block 22 Barracks 7:50am	Visitors†	5.0‡ Foreground
2	Minidoka NHS – Block 22 Barracks 4:02pm	Visitors†	5.0‡ Foreground
3	Interstate 84	Travelers	6.0 Foreground
4	Milner Historic Recreation Area	Visitors	9.4 Foreground
5	Idaho Highway 24	Travelers	0.9 Immediate foreground
6	U.S. Highway 26 – Peaks to Craters Scenic Byway/Richfield	Travelers, residents	11.5 Middleground
7	Idaho Highway 75 – Sawtooth Scenic Byway	Travelers	17.4 Middleground
8	Dietrich City Park	Residents	6.5 Foreground
9	U.S. Highway 26 – Peaks to Craters Scenic Byway	Travelers	26.6 Background
10	Wilson Butte Cave – North, East, South, and West	Visitors†	0.9 Immediate foreground
11	Devil's Corral	Visitors†	9.2 Foreground
12	The Blowout	Visitors	15.6 Middleground
13	Laidlaw Airstrip/corrals	Visitors	11.1 Middleground
14	Dean Brown Road	Visitors	12.6 Middleground
15	Craters of the Moon National Monument and Preserve	Visitors†	19.3 Middleground
16	Minidoka NHS – Honor Roll 7:20am	Visitors†	5.5‡ Foreground
16	Minidoka NHS – Honor Roll 5:20pm	Visitors†	5.5‡ Foreground
17	Sid Butte	Visitors†	3.7 Foreground

* Viewer direction toward the project corresponds with photograph simulations in Appendix C of SWCA (2024).

† Visitors may include affected communities as described in Section 3.5 (Cultural Resources) and Section 3.6 (Environmental Justice and Socioeconomics).

‡ Peripheral distance is approximately 1.7 miles. From this location, the viewer focus is directly head-on with peripheral views (side views) of the project, which may attract attention but would not be the primary focus of attention. The nearest turbine corridor is 1.7 miles in periphery for KOP 2 (immediate foreground). The degree of visual change is reflective of project in peripheral vision from KOP orientation.

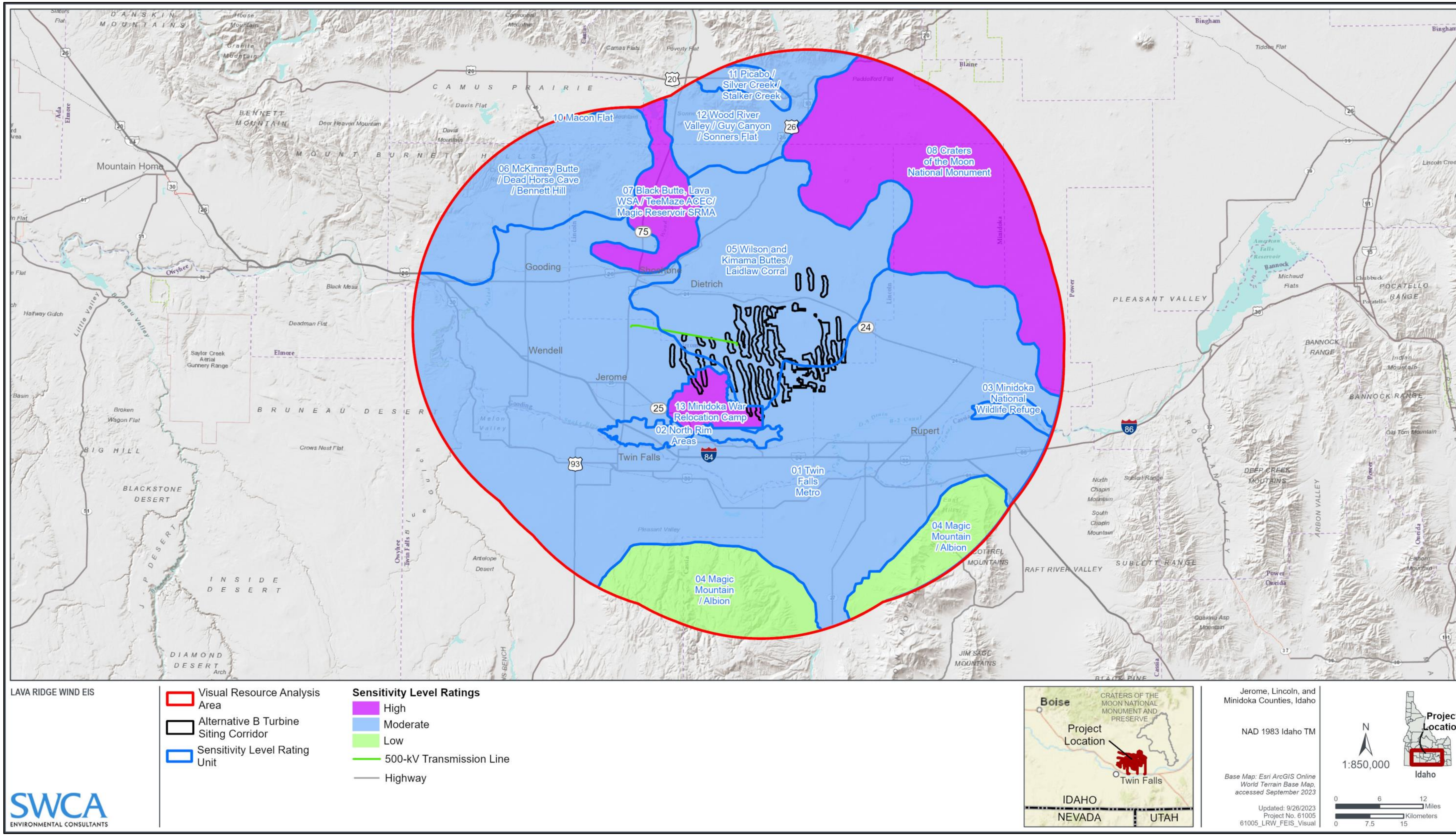

Figure 3.16-2. Sensitivity level ratings in the visual resource analysis area.

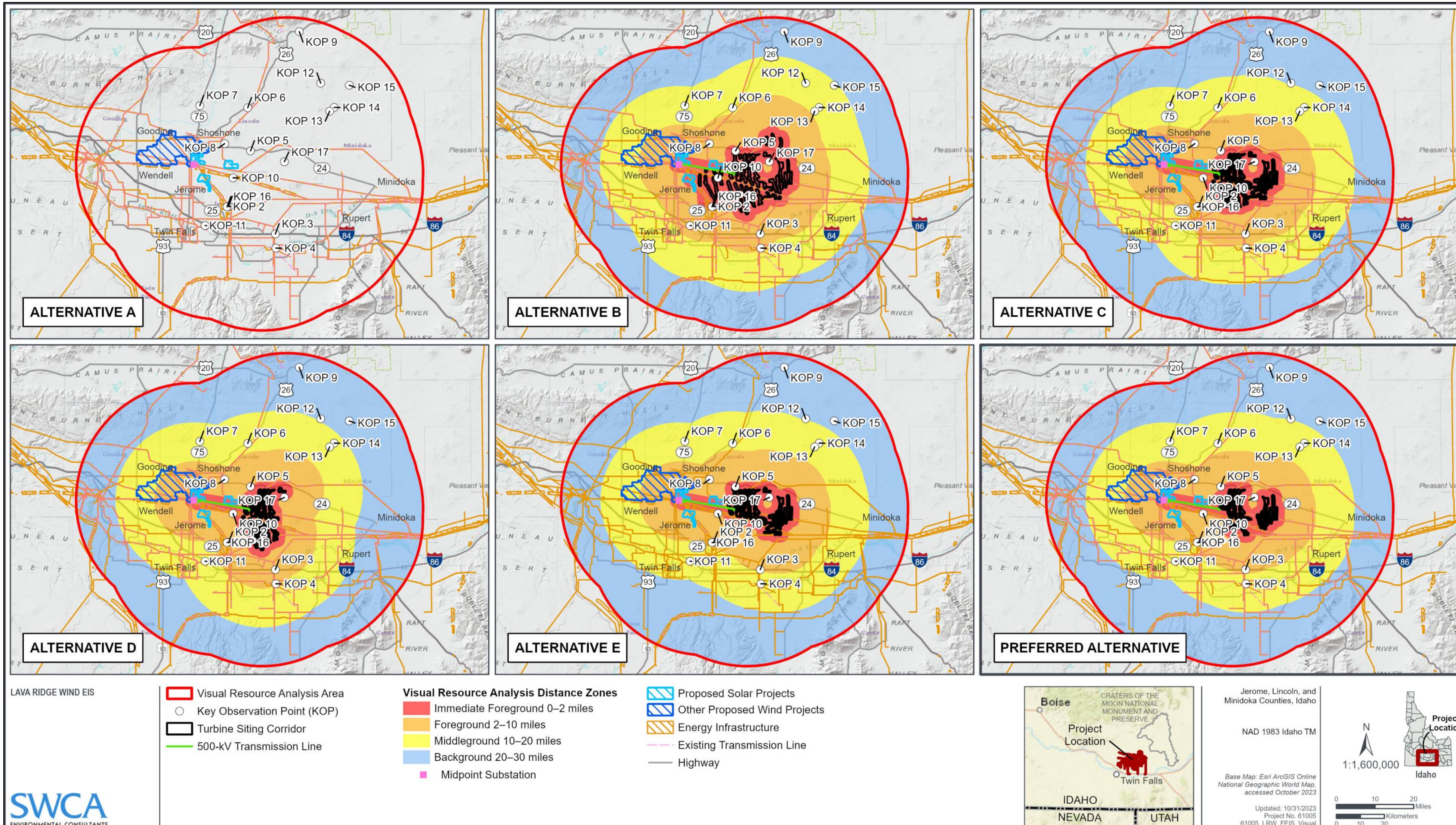

Figure 3.16-3. Key observation points and distance zones in the visual resource analysis area.

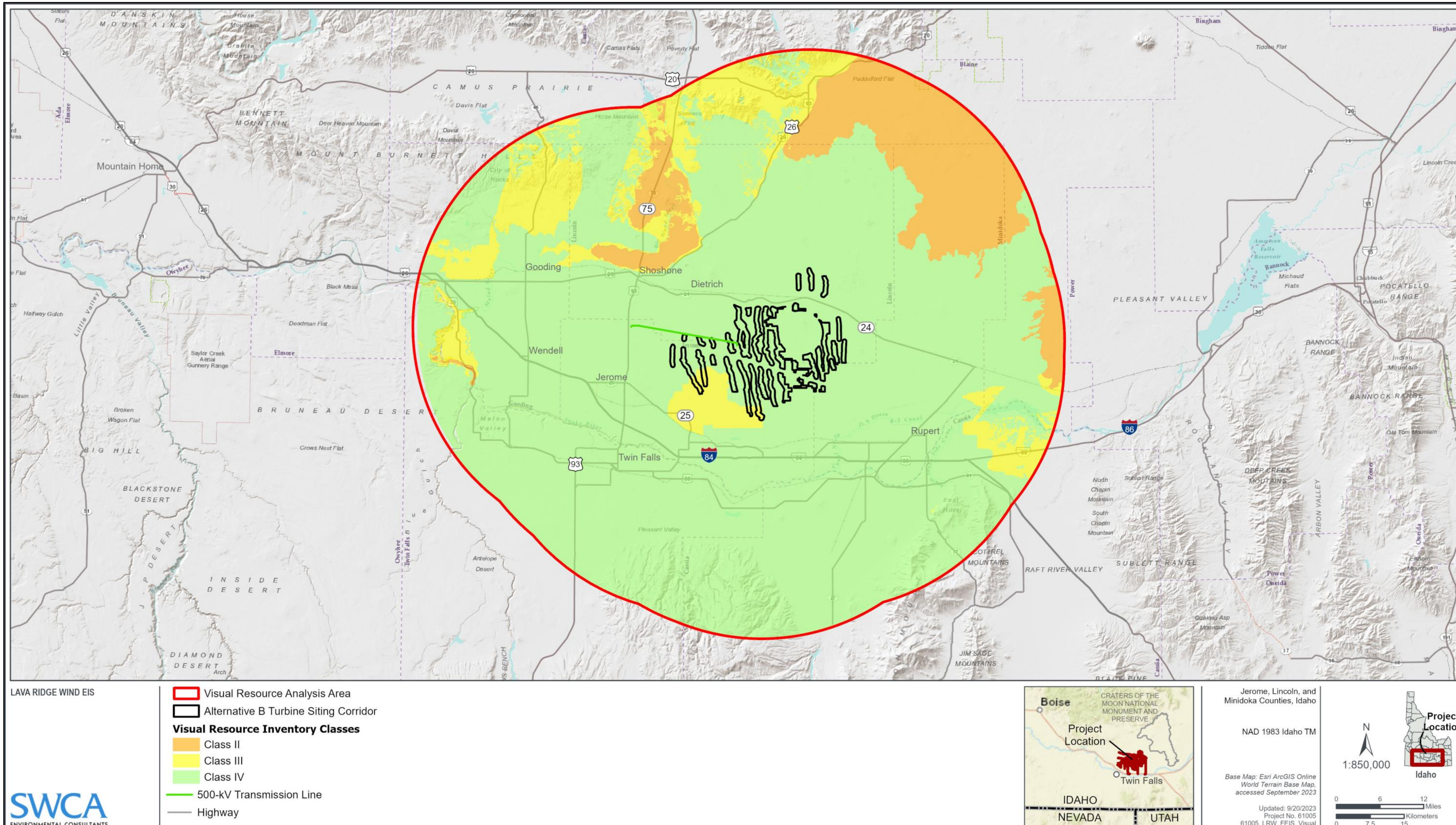

Figure 3.16-4. Project level visual resource inventory classes.

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3.16.1.1.3 INTERIM VISUAL RESOURCE MANAGEMENT CLASSES

Visual resources on BLM public lands are managed in accordance with the VRM system. The visual analysis area for the project is managed under BLM (1986b), as amended, which provides management direction; however, BLM (1986b) does not establish VRM classes or associated visual management objectives for the analysis area. To address the issue of visual resource management within the analysis area, the BLM has a process that establishes interim VRM classes and objectives on a project basis. Interim visual management objectives are established where a project is proposed and there are no RMP- or management framework plan–approved VRM objectives (BLM 1984). The purpose of interim VRM class objectives is to provide a surrogate process to bring into compliance existing land use plans that are not in compliance with VRM policy on a project-by-project basis until such time that the land use plan is revised or amended to include the planning area–wide VRM class objectives. Interim VRM classes are project based and specific to only the project area. Determining interim VRM classes is an iterative process that accounts for developing alternative VRM classes, evaluating their compatibility with the land use plan, and determining the most appropriate interim VRM class objective for the existing landscape. The interim VRM class must conform with other management objectives and land use allocations. Determining an interim VRM class objective follows a systematic evaluation to disclose an achievable resource development outcome while protecting the visual resource to the maximum extent possible. Determination of the VRM classes for the project is derived from the overall VRI classes and components contained within the analysis area.

The analysis area contains 19 SQRUs, and the siting corridors are proposed within three SQRUs: Snake River Plain (Class C score of 9.5), Kimama Butte (Class C score of 8.5), and Shale Butte (Class C score of 8). Overall, the SQRU classes containing the siting corridors are rated as having a low scenic quality. These SQRUs are noted as being generally flat and broad with subtle slopes and similar vegetation throughout. There are notable cultural modifications within the SQRUs, including urban development, agriculture development and farming infrastructure, transmission lines, substations, and roadways, which add discordant elements to the landscape.

The analysis area contains 13 SLRUs, and the siting corridors are proposed within the following three SLRUs:

- Twin Falls Metro (score of moderate): In this SLRU, areas of relative visual importance (e.g., Minidoka NHS and Snake River Canyon) are in view to a combination of sensitive viewers. There is also a moderate level of tolerance related to visual changes within the landscape in general based on the degree of modifications that currently exist in this SLRU.
- Wilson and Kimama Buttes/Laidlaw Corral (score of moderate): In this SLRU, the documented sensitivity level indicates a combination of the amount of use, diverse user groups, public interest related to scenic byways and the adjacency of CRMO, numerous buttes and wilderness analysis areas, and a relative visual importance.
- Minidoka WRC (score of high): Several local sensitive sites are contained within this SLRU (e.g., Minidoka NHS) where the intactness of the surrounding visual context and character of the area are important and have a higher sensitivity to visual change. This higher sensitivity is reflected in the historical and cultural significance of the SLRU and the sensitivity of visitors.

Because of the scale and visibility of the project wind turbines, this analysis used the immediate foreground, foreground, middleground, and background distance zones following research conducted by Argonne National Laboratory. These distance zones have been offset from the locations where vertical project components occur within the analysis area (see Figure 3.16-3).

Project components (e.g., lower portions of the turbines) in the middleground and background zones would be partially obscured by the existing landscape (existing structures, topography, and vegetation); however, because of the height of the turbines, the rotating blades would still be visible within the analysis area in all distance zones.

The project-level inventory and analysis conducted by the BLM determined that the visual resources within the siting corridors would fall primarily under Class IV, with smaller portions of both Class II and III (see Figure 3.16-4) (SWCA 2024). The turbine siting corridors occur mostly within VRI Class IV with some southern portions in VRI Class III.

To establish interim VRM classes for the siting corridors, the BLM considered existing VRI data (SWCA 2024) in correlation with other resources; land uses as described in BLM (1986b), as amended; existing development and land uses in the landscape; and impacts to the visual values identified through a review of the VRI data and project Contrast Rating Worksheets (SWCA 2024 [Appendix B]). The BLM established interim VRM classes for the siting corridors of VRM Class IV for most of the siting corridors and VRM Class III for the siting corridors within 1 mile from ID 24 (Figure 3.16-5). The objectives for these classes are defined by BLM (1986a) as follows:

- VRM Class III: The objective of this class is to 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.
- VRM Class IV: The objective of this class is to provide for management activities which 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.

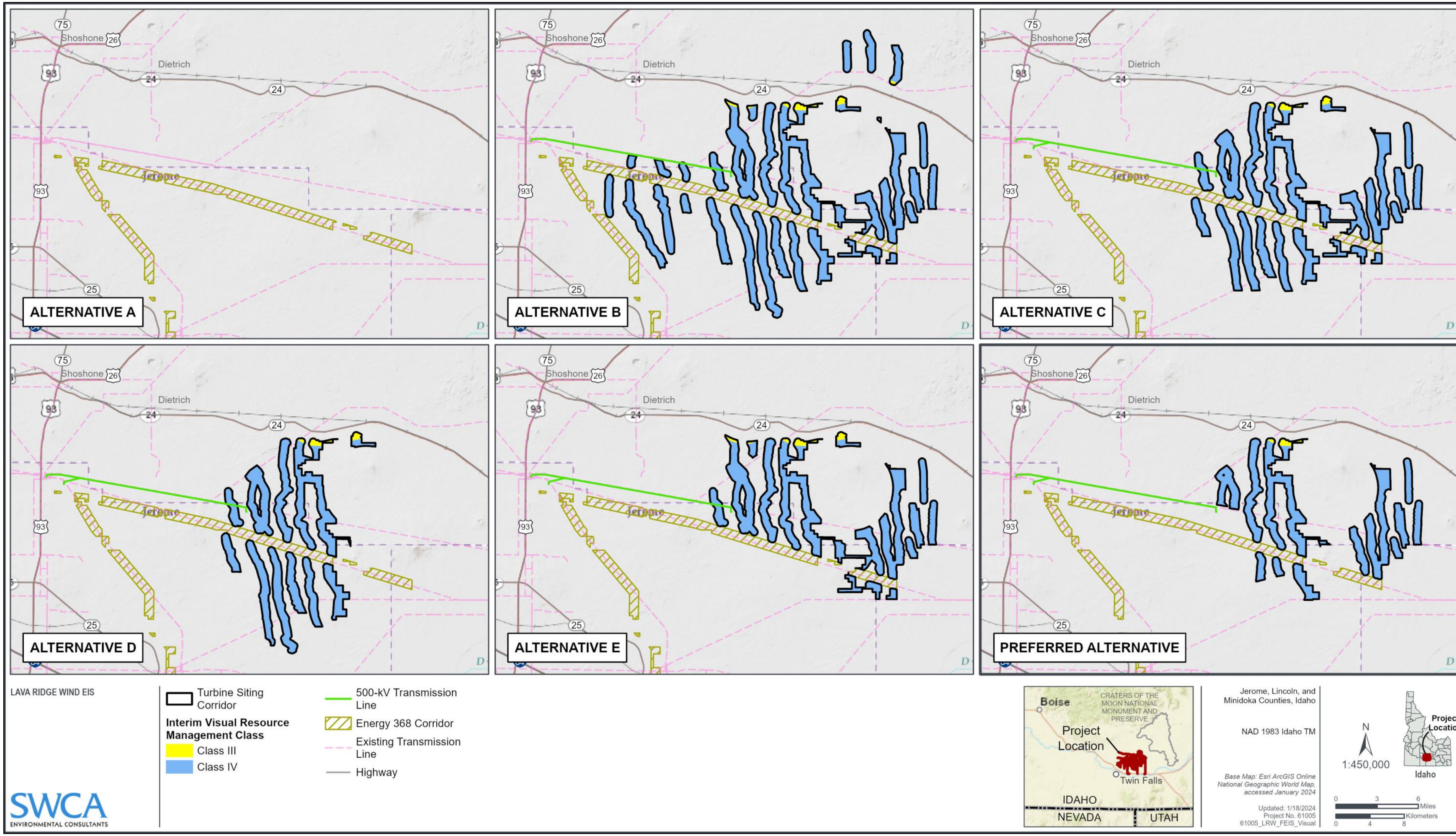

Figure 3.16-5. Interim Visual Resource Management classes for all alternatives.

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3.17 WATER AND WETLANDS RESOURCES (SEE APPENDIX 15)

3.18 WILDLIFE (SEE MAIN EIS AND APPENDIX 15)

3.18.1 Wildlife Movement (non-game mammals and reptiles) (see Appendix 15)

3.18.2 Big Game Habitats and Populations (see main EIS)

3.18.3 Amphibians (see Appendix 15)

3.18.4 Pygmy Rabbit (see Appendix 15)

3.19 MINIDOKA NATIONAL HISTORIC SITE INTERPRETIVE PURPOSE

The Affected Environment for this section can be reviewed in Section 3.20.3 (Minidoka War Relocation Center and Minidoka National Historic Site).

3.20 MINIDOKA WAR RELOCATION CENTER AND MINIDOKA NATIONAL HISTORIC SITE

3.20.1 Introduction

The potential for non-physical impacts to cultural resources (at the Minidoka National Historic Site [NHS]), Japanese American and Minidoka-connected communities, and the NPS Minidoka NHS interpretive purpose are discussed in EIS Sections 3.5.5.2, 3.6.1.2, and 3.19.2, respectively. These impacts are the result of visual changes to the landscape character and scenic quality (EIS Section 3.16.1.2) and the addition of noise to the soundscape surrounding Minidoka NHS. In addition to the information provided in the EIS, this appendix provides context for assessing potential impacts related to potential changes to the environmental setting at Minidoka NHS.

3.20.2 Overview

3.20.2.1 History of the Minidoka War Relocation Center

Minidoka War Relocation Center (Minidoka WRC), located in Jerome County, Idaho, was a 34,000-acre WWII–era Japanese American incarceration site known locally as Hunt Camp. It was established in 1942 under the authority derived from EO 9066 (Authorizing the Secretary of War to Prescribe Military Areas) on BOR manage land. Of the 34,000 acres, nearly 950 were residential and administrative areas, whereas the remaining area included extensive farm plots or were undeveloped high desert sagebrush steppe (NPS 2007). Today, a 388-acre portion of this original relocation center is managed by the NPS as the Minidoka NHS.

Minidoka WRC represents one of the largest War Relocation Authority confinement sites. From 1942 to 1945, Japanese immigrants, Japanese Americans (Nikkei), and their families, including Alaska Native spouses and mixed Alaska Native and Japanese American children, were forcibly removed from their homes in Washington, Oregon, California, and Alaska, as well as other locations, and were incarcerated at Minidoka WRC (NPS 2006, 2016, 2022b). Minidoka WRC was one of 10 camps operated by the War Relocation Authority (NPS 2016:8). Construction of the relocation center began on June 5, 1942, and the first incarcerated Nikkei arrived on August 10, 1942. Minidoka WRC contained more than 600 buildings, which included administrative and warehouse buildings, 36 residential blocks, schools, fire stations, and a hospital. Each residential block contained 15 buildings: 12 barracks, a recreational hall, a mess hall, and a lavatory-laundry building. The relocation center’s population peaked at 9,500, with more than 13,000 Nikkei passing through its gates until it officially closed on October 28, 1945.

Throughout the late 1940s and early 1950s after the Minidoka WRC had closed plots of land, buildings, and even furniture that once made up Minidoka WRC were given away in lotteries by BOR to returning WWII veterans as homesteads and farms. The irrigated fields and agricultural landscape remain as an enduring legacy of the Japanese American and related Minidoka-connected communities once incarcerated at the relocation center. Although most landscape features of Minidoka WRC have since been removed, scattered buildings, foundations, pathways, water works, garden plots, and artifact concentrations remain, such as the NRHP-eligible Minidoka WRC Landfill (NPS 2007).

3.20.2.2 Minidoka National Historic Site

On January 17, 2001, the Minidoka Internment National Monument was established through a presidential proclamation [7395] as the 385th unit of the national park system, preserving and protecting 72.75 acres of the original approximately 34,000-acre Minidoka WRC (NPS 2016:7). The U.S. Congress passed Public Law 110-229 on May 8, 2008, expanding the national monument to 388 acres, changing the name to Minidoka NHS, and adding the Bainbridge Island Japanese American Memorial in Washington State to the national park unit. In 2014, Congress passed Public Law 113-171, renaming the memorial Bainbridge Island Japanese American Exclusion Memorial, which honors the first Japanese Americans forced from their homes under EO 9066 (NPS 2016, 2022b). Collectively, these two locations, 700 miles apart, make up Minidoka NHS. They offer the opportunity to interpret the historic events and lives impacted by the exclusion, forced removal, and unjust incarceration of Nikkei during WWII (NPS 2016:7).

Minidoka NHS was established to protect, preserve, and interpret the resources associated with the former Minidoka WRC where Japanese Americans were incarcerated during WWII, and represents a significant part of WWII and American history. The NPS interpretive purpose of Minidoka NHS is listed in Public Law.

Public Law 110-229, Section 313, instructs the Secretary of the Interior to interpret the following:

- (I) the story of the relocation of Japanese Americans during World War II to the Minidoka Relocation Center and other [incarceration sites] across the United States;
- (II) the living conditions of the [incarceration sites];
- (III) the work performed by the [incarcerees] at the [incarceration sites]; and
- (IV) the contributions to the United States military made by Japanese Americans who had been [incarcerated].

The NPS implements their legislative mandate for Minidoka NHS through the statutorily required *Minidoka Internment National Monument General Management Plan* (NPS 2006) and other documents. NPS (2013), *Foundation Document, Minidoka National Historic Site, Idaho and Washington* (NPS 2016), and *Cultural Landscape Report, Minidoka National Historic Site* (NPS 2023a) in addition to NPS (2006) define how the NPS will implement the interpretive purpose of Minidoka NHS. The Minidoka NHS interpretive purpose conveys understanding of the four themes and provides an overall interpretive purpose to "provide opportunities for public education and interpretation of the exclusion and unjust incarceration of Nikkei – Japanese American citizens and legal residents of Japanese ancestry – in the United States during World War II" (NPS 2016).

Visitor education and interpretation are accomplished at Minidoka NHS through immersion in the current setting, including its restored and reconstructed Minidoka WRC features. The term *interpretation* in this section means "providing opportunities for people to form intellectual and emotional connections to gain awareness, appreciation, and understanding of the resources of the [NPS] System" (54 USC 100801). The term *education* in this section means "enhancing public awareness, understanding, and appreciation of the resources of the [NPS] System through learner-centered, place-based materials, programs, and activities that achieve specific learning objectives as identified in a curriculum" (54 USC 100801).

The Minidoka NHS parkwide visitor experience goals pertinent to this analysis are as follows (NPS 2013:28–29):

- Have opportunities for reflection.
- Contemplate, relax, and enjoy park resources while having a safe visit.
- Understand the relevance of this site to contemporary events and relate the WWII Nikkei experience to the visitors' own cultural heritage – now or historically, gaining insight that this treatment potentially is not just something that happened to others.
- Understand the institutional missions of Minidoka NHS and its partners; and recognize the contributions each organization makes to the preservation and interpretation of the park.

The Minidoka NHS (Idaho unit) visitor experience goals pertinent to this analysis are as follows (NPS 2013:29–30):

- View the landscape, specifically how it looked historically during construction and deconstruction of Minidoka WRC and how it looked immediately following WWII when homesteaded by WWII veterans[8]
- Feel the sense of isolation described by those incarcerated at Minidoka
- Discover what crossing the line from freedom to incarceration was like by entering the recreated historic entrance
- Understand the extent of Minidoka's WWII farm operations
- Learn about what daily life was like for the inhabitants of Minidoka and the surrounding communities they helped or who helped those incarcerated during WWII
- See original camp structures on-site and access them for interpretive and educational programming
- Walk along historic camp pathways in the preserved cultural landscape

The Minidoka NHS visitor education and interpretation programs are designed to convey the site's interpretive purpose and significance. Visitors should have the opportunity to learn and to answer the question, "Why is the Minidoka National Historic Site important and significant to me as a 21st century visitor?" (NPS 2013).

[8] After WWII ended, the land was converted to homesteads and offered to returning war veterans, excluding Japanese American veterans.

The following fundamental resources and values for Minidoka NHS are important aspects of the park that contribute to NPS's ability to carry out their interpretive objectives (NPS 2006, 2016):

- Historic Structures, Cultural Landscapes, and Archeological Resources: Minidoka contains several historic structures and features, cultural landscapes and viewsheds, and archeological resources on the site of the former Minidoka War Relocation Center in southern Idaho. These fundamental resources are associated with the period of incarceration (1942–1945) and include fire station No. 1, the warehouse area, swimming hole, root cellar, and the camp dump.
- Environmental Setting: Minidoka's remote location in the high desert of Idaho provides an immersive setting that is fundamental to the visitor experience. Views of open fields and distant mountains create a sense of isolation on a vast landscape where Minidoka once stood. Built in 1909, the North Side Canal was constructed as a main irrigation canal from the Snake River, bringing water for agricultural production to the region and influencing the layout of Minidoka. The smell of high desert sagebrush contributes to this environmental setting. Extreme changes in temperature, the arid environment, and high winds that the people at Minidoka experienced are part of the environmental setting that are felt today. Experiencing this environmental setting allows visitors to better understand and connect to the daily lives at Minidoka. (NPS 2016).
- Museum Collections: The museum collections at Minidoka National Historic Site provide insights into the complexity of the exclusion, unjust incarceration, and its effects on individuals and society. The museum collection contains excavated archeological collections, manuscripts, oral history, gifts of artifacts that survivors and families have donated to the park, and associated records related to Minidoka. The Bainbridge Island Historical Museum currently holds many objects in trust and serves as an archive.
- Cultural Traditions: Nikkei cultural traditions, values, and attitudes are essential to understanding how Nikkei experienced and reacted to incarceration and life within the camp. These include concepts of gaman (perseverance), shikata ga nai (it cannot be helped), giri (duty), honor, family, loyalty, and nationalism.
- Commemoration and Healing: Minidoka and the Bainbridge Island Memorial provide places for engagement, reflection, and healing. These sites provoke connections to individuals affected by the World War II exclusion, forced removal, and unjust incarceration, and serves to commemorate those who survived this difficult chapter of American history. (NPS 2016)
- Public Understanding, Education, and Involvement: Educating and engaging the public in understanding the history of the incarceration of Japanese Americans during World War II, the fragile nature of civil rights, and the need to protect civil and constitutional rights in the United States is essential to both Minidoka and the Bainbridge Island Memorial. Working with partner groups, including the Friends of Minidoka, Bainbridge Island Historical Museum, and Denshō Project, is important to achieving goals of fostering public awareness and support for Minidoka National Historic Site. At Minidoka, special events such as the pilgrimage and the civil liberties symposium connect the public to the history that occurred here and its significance today. The Bainbridge Island Memorial is adjacent to a large urban population, providing an ideal location to promote greater public understanding, education, and involvement. (NPS 2016)

The NPS has also identified post-WWII homesteading as an important resource and value but also identifying that it was not fundamental to the purpose of the park (NPS 2016). The post-WWII homesteading resources within the park unit are part of the cultural landscape at the Minidoka NHS and the surrounding agricultural landscape also provides context concerning homesteading contributes to the setting.

3.20.2.3 Japanese American and Minidoka-Connected Communities

Incarcerees at the Minidoka WRC originated from the West Coast states of Washington, Oregon, Alaska, and California. In addition to Japanese Americans, Alaska Native spouses and mixed Alaska Native and Japanese American children were also among those incarcerated (NPS 2007). A small number of incarcerees who were transferred to Minidoka from the Kooskia Internment Camp in north-central Idaho included Japanese Americans from Alaska, Hawaii, Peru, Mexico, and Panama (NPS 2006; Niiya 2023). All Minidoka incarcerees, as well as their descendants, friends, or other people who feel strongly about the injustices associated with the Minidoka site, are part of the broader Minidoka-connected community, regardless of their racial or ethnic identity. The Japanese American and Minidoka-connected communities have more than two generations with cultural identity and traditions around Minidoka NHS.

Minidoka NHS is a member of the International Coalition of Sites of Conscience and is one of two sites in the state of Idaho (International Coalition of Sites of Conscience 2022a). The International Coalition of Sites of Conscience defines a *site of conscience* as “a place of memory – such as a historic site, place-based museum or memorial – that prevents this erasure from happening, to ensure a more just and humane future. Not only do sites of conscience provide safe spaces to remember and preserve even the most traumatic memories, but they enable their visitors to make connections between the past and related contemporary human rights issues” (International Coalition of Sites of Conscience 2022b). The site offers opportunities to make connections between contemporary human rights issues and past injustices inflicted upon Japanese Americans and Minidoka-connected communities during WWII by the federal government. Minidoka NHS is a sacred pilgrimage site for Minidoka survivors, their descendants, their friends, and others who care deeply about these injustices (see Tables A-1 and A-2 in EIS Appendix 14), with organized commemorative events happening at Minidoka NHS since 1979.

Japanese American and Minidoka-connected communities have endured long-term and intergenerational psychological impacts of incarceration in the form of post-traumatic stress; ethno-racial stigma and discrimination; weakened cultural ties; lingering economic effects; and lingering feelings of guilt, shame, anger, or injustice (Iwamura 2007; Nagata and Patel 2021). Those who were incarcerated suffered tremendous economic losses from the forced closure of businesses and consolidation of property and belongings to “only what they could carry without knowing where they were going or for how long” (NPS 2006:15), which has had lasting negative effects on intergenerational wealth and is one of many factors contributing to the long-term and intergenerational psychological impacts of incarceration (Nagata and Patel 2021). The Minidoka NHS offers opportunities for members of the Japanese American and Minidoka-connected communities to heal from their traumas through pilgrimages and other types of sacred rituals and practices (Iwamura 2007).

3.20.2.4 Scenic Quality, Visual Sensitivity, Night Skies, and Noise

A relative scenic quality was assigned to landscape units, in the analysis area by rating the scenic quality evaluation key factors of landform, vegetation, water, color, adjacent scenery, scarcity, and cultural (humanmade) modifications (BLM 1986c). Scenic quality ratings of the analysis area are shown in Figure 3.16-1 (see additional details in SWCA [2023]).

The siting corridors for the Project and Minidoka NHS are located in an area with a scenic quality rating of C (lesser visual variety than scenic quality B landscapes). Common scenic quality evaluations factors surrounding the siting corridors and Minidoka NHS include a generally flat plain, with a subtle slope and soft undulations from north to south with broad, distant views of surrounding mountain ranges. Vegetation in these areas provide a mix of sagebrush and low grasses and contain developed agricultural fields and domestic vegetation species, which add seasonal color and texture variety throughout. The surrounding scenery contain a mix of urban development, agricultural development, transmission lines, substations, and farming infrastructure, which, when combined, add discordant elements within the natural landscape.

Visual sensitivity level rating units reflect attitudes and perceptions held by people regarding the landscape and, in general, reflects the public's level of sensitivity for noticeable change to the landscape. Visual sensitivity is often used to select key observation points (KOPs). Visual sensitivity ratings range from high sensitivity (i.e., public is highly aware of incremental changes in the subject landscape) to low sensitivity (i.e., public has little concern with changes in the subject landscape). The siting corridors are in an area of moderate sensitivity and the Minidoka NHS and historic Minidoka WRC are located within a high sensitivity area. Figure 3.16-2 illustrates the visual sensitivity ratings for the analysis area (see additional details in SWCA [2023]).

The KOPs that were selected to represent viewer experience at Minidoka NHS Visitor Center (KOP 1), Block 22 Barracks (KOP 2), and the Honor Roll (KOP 16). The existing condition at each of these KOPs and simulations representing the conditions under each action alternative are provided in EIS Appendix 5.

The night sky at Minidoka NHS is significantly brightened from existing lighting in Twin Falls and Jerome, Idaho, and other communities along the I-84 corridor. Currently, the darkest part of the horizon is toward the northeast, north, and northwest of the site (the direction of the Lava Ridge Wind Project). Existing night sky brightness recorded at Minidoka NHS for the night skies assessment ranged from 20.29 mag. arcsec^{-2} at 10 degrees above the horizon to 21.15 mag. arcsec^{-2} at the highest point in the sky (90 degrees) (NPS 2021).

The acoustic environment is an important component of the environmental setting at Minidoka NHS and has its own intrinsic value (NPS 2015). The NPS modeled predicted mean noise levels in 2015 at Minidoka NHS to be approximately 32 dBA (including the average existing sound level with the influence of humanmade sounds), which is 6.0 dBA above the natural ambient sound level (NPS 2015).

3.20.3 Affected Environment

3.20.3.1 Setting and Feeling

In 1979, 6.06 acres of the former Minidoka WRC entrance area were listed on the NRHP for significant association with military, politics/government, and social/humanitarian historic themes (NPS 2006). The 6.06-acre parcel included the remains of the historic guard station, visitors' reception center, parking lot, and garden designed by Fujitaro Kubota and the location of the Honor Roll.

As a unit of the National Park System, the 388-acre Minidoka National Historic Site was administratively listed to the National Register of Historic Places in 2008. The site is nationally significant under Criterion A for its association with war relocation efforts and the associated mass incarceration of Japanese Americans during World War II. Additionally, the John Herrmann farm is locally significant under Criterion A for its association with federal government efforts to settle veterans on reclaimed land in the West. The primary period of significance for the site begins in 1942, when the Minidoka Relocation Center was constructed, and extends to 1945, when the center closed. A second period of significance includes the year 1952, when the John Herrmann farm was established and many of its buildings and structures were constructed as part of a Farm-In-A-Day event. Collectively, the remaining buildings, structures, and landscape features convey important information about the construction, development and occupation of the Minidoka Relocation Center during the primary period of significance as well as farming and homesteading by veterans, including John Herrmann, on the site of Minidoka after World War II. (NPS 2023).

Minidoka NHS retains fragmentary portions of some landscape characteristics. These include fragmentary elements of natural systems and features, spatial organization, topography, land use, cultural traditions, circulation, and vegetation. The site includes remnant features of the original camp related to agriculture, Japanese American heritage, politics/government, and social history. Contributing features that remain from the historic period include the rock structures of the military police building and reception building, Japanese-style entrance garden, swimming hole, root cellar, portions of the circulation system, and numerous buildings foundations and rock lined walkways. Though the landscape as a whole has lost integrity, the extant landscape features help to convey the historic character of the National Monument and therefore contribute to the existing National Register site (NPS 2007).

A TCP associated with Minidoka has been proposed by the Japanese American and Minidoka-connected communities, Friends of Minidoka, and National Parks Conservation Association. A study report for the TCP identifies the viewshed surrounding Minidoka as the TCP and recommends it for listing on the NRHP. The Idaho State Historic Preservation Office (SHPO) has concurred with the eligibility of a TCP but seeks more information to support its significance and to establish an appropriate boundary.

3.20.3.2 Japanese American and Minidoka-connected Communities

The construction of past transportation and utility infrastructure projects within the viewshed and soundscape of Minidoka NHS and Minidoka WRC (see Figure 3.5-2) has incrementally impacted the setting and feeling of the sites over time. Past modifications to the landscape character near Minidoka NHS and Minidoka WRC have had a commensurate effect on visitor experience by reducing visitors' experience of remoteness, isolation, and abandonment, which is needed to engage in remembrance and healing. Changes to the setting, feeling, and visitor experience at Minidoka NHS and Minidoka WRC are viewed by members of the Japanese American and Minidoka-connected communities as acts of intrusion and desecration to a sacred site and a continuation of racial injustice (BLM 2022c).

The Japanese American and Minidoka-connected communities have expressed feelings of having their concerns marginalized or ignored regarding effects of existing and future planned development projects. Historical interactions between the Japanese American community, the federal government, and project developers have been filled with ongoing points of frustration and conflict, which has reinforced feelings of distrust and being dishonored within the Japanese American community (BLM 2022c). This includes concerns expressed by the Japanese American community regarding the SWIP-North 500-kV transmission line corridor, which has been authorized for construction and crosses through Minidoka WRC, as well as a proposed nearby feedlot. The Japanese American community has repeatedly expressed their concerns over the effects of previously proposed projects on Minidoka NHS and Minidoka WRC, and the community views any continued proposals for development in the area as an affront to their community and a continuation of the injustice that Minidoka NHS represents (BLM 2022c). The collective effect of past and present development projects on the Japanese American community and their respective interests and concerns has left members of the community with feelings of betrayal, resentment, and anger at the desecration of the site and their families' and community's historical and continued injustice.

The landscape setting and character of Minidoka NHS and Minidoka WRC are key components of the visitor and survivor experience of remoteness, isolation, abandonment, and injustice for those who were incarcerated at the site. Specifically, visitors and survivors highly value their ability to experience the wide-open views of the landscape and the nightscapes as would have been experienced by incarcerated Japanese Americans at the time of Minidoka WRC incarceration. The site still evokes vivid memories and strong emotions from survivors who were incarcerated there almost 80 years ago (BLM 2022).

Concerns have been expressed regarding not simply the visual impact but also the emotional impact the appearance of the project on the landscape could have on the Japanese American and Minidoka-connected communities' experience of Minidoka NHS and Minidoka WRC (see Tables A-1 and A-2 in EIS Appendix 14 [Summary of Public Comments on the Draft Environmental Impact Statement]). Those Japanese Americans and Minidoka-connected communities consulting on the project—specifically, the Friends of Minidoka—have proposed that areas surrounding Minidoka NHS, including Minidoka WRC, be considered a TCP (see EIS Appendix 14) and managed as an ACEC (see EIS Appendix 13[9]). In their comment letter on the project, the Friends of Minidoka and National Parks Conservation Association) have provided the following statement related to the proposed ACEC.

> Minidoka represents a place where Japanese American and Alaska Native families were displaced, separated, and isolated from other Americans. The unconstitutional forced incarceration of the Japanese American community has left an ongoing legacy of trauma and loss and it has motivated the community to fight to protect civil rights for religious, racial and ethnic groups.
>
> Since the mass incarceration of Japanese Americans, Congress and Presidential administrations of both parties have worked with the Japanese American families and community to acknowledge, heal, and address the ongoing impacts of the incarceration. Designating Minidoka and other incarceration sites has been part of this longstanding effort. Unfortunately, Minidoka NHS does not adequately protect and preserve all of the cultural and historic lands where families suffered, worked, and overcame racial prejudice.
>
> We appreciate the Biden Administration's commitment to uplift the Asian American Native Hawaiian and Pacific Islander (AANHPI) community, "tell the full story of America" through the Amache National Historic Site, establish the Japanese American World War II History Network, and "advance an ambitious, whole-of-government approach to racial equity and support for underserved communities and to continuously embed equity into all aspects of Federal decision-making."
>
> We call on the BLM to accept our proposal to establish a 237,000 acre Greater Minidoka Area of Critical Environmental Concern to preserve the cultural and historic landscape and traditional uses of the land surrounding Minidoka. (Friends of Minidoka and National Parks Conservation Association 2023)

The DOI Office of Collaborative Action and Dispute Resolution outreach efforts to the Japanese American and Minidoka-connected communities in Idaho and throughout the United States have resulted in the compilation of a report detailing the significance of Minidoka NHS and WRC, and adverse impacts of the project on the significance of the NHS and WRC, as well as their personal experience and visitors' experiences from this community's perspective (BLM 2022). In consultation with the Japanese American and related Minidoka-connected communities, an "important point made during discussions concerned the context of the site as a place of American significance and remembrance . . . where the surrounding landscape is a key component to telling the story . . . the power of these places cannot be felt or truly

[9] EIS Appendix 13 provides the BLM's detailed preliminary evaluations for two potential ACECs associated with Minidoka WRC. The ACEC proposal submitted to the BLM by the Friends of Minidoka was for an area referred to as the "Greater Minidoka" area. The BLM conducts ACEC review, full evaluation, and designation through land use planning processes. This project-specific NEPA review of MVE's application for the Lava Ridge Wind Project is not associated with the development or revision of a land use plan. In accordance with the BLM ACEC manual (BLM 1988), the BLM conducted preliminary evaluations of two potential ACECs (the Minidoka WRC boundary and also the proposed Greater Minidoka area). The BLM preliminarily evaluated the two areas for relevance and importance criteria required for ACEC designation (BLM 1988) and to identify whether interim management is warranted to protect values contributing to these criteria. Having conducted these preliminary evaluations, the BLM will apply interim management objectives to the BLM public lands within Minidoka WRC (see EIS Figures 2.4-1 and 2.4-2); the BLM is considering Minidoka WRC as a potential ACEC.

understood unless you go there to see, hear, and feel the history" (BLM 2022:11). Through DOI Office of Collaborative Action and Dispute Resolution outreach efforts, Japanese Americans stated the following:

> This community wants to know that the US Government is committed to preserving this place for future generations to experience the barracks and structures set against vast and remote vistas [views] that speak to the feelings of isolation and "no-escape" the people arriving there in 1942 felt. (BLM 2022:11)

In their *Comments on the Notice of Intent for the Lava Ridge Wind Project*, the NPS presented the following statements regarding concerns for adverse non-physical project effects to Minidoka NHS's integrity of setting, feeling, and association (NPS 2021):

> A central characteristic of Minidoka National Historic Site's integrity and historical significance is its setting in a remote and open expanse of agricultural fields northeast of Twin Falls, Idaho. The proposed project and its accompanying field of mechanical turbines could alter the open character and expansive views of this isolated agrarian location that compose the historic setting of the property.
>
> Today, Minidoka National Historic Site conveys feelings of isolation and abandonment, expressing a sense of the desolation experienced by Japanese Americans during the incarceration period. The feeling of the site evokes the victimization, injustice, and racism that are important aspects of the site's history. [If] the wind project is built, visitors to the historic site may no longer experience the feelings of wide-open spaces devoid of large-scale development characteristic of the incarceration period and agricultural and reclamation projects of the twentieth century. In this way, the presence of turbines, transmission towers, collection lines, battery storage facilities, maintenance facilities, and substations could impact the feeling of the site.
>
> Minidoka met the War Relocation Authority's site selection criteria and was one of the earliest sites selected. The War Relocation Authority's criteria included large tracts of public land in remote locations away from "strategic works" that could provide year-round work opportunities. Other criteria included land available for agriculture, access to water, remoteness from population centers, and close proximity to railroads for shipment of materials and the Japanese American populations. (NPS 2021)

The Japanese American and Minidoka-connected communities have expressed in Section 106 consultation that project impacts would be adverse, regardless of whether they are determined as such under the NHPA. The Japanese American and Minidoka-connected communities have expressed that no mitigation of project impacts could protect the site from the intrusion and desecration of, what to the community is considered, a sacred site. The Japanese American and Minidoka-connected communities would like to see the project located at other sites that would not impact Minidoka NHS rather than in the currently proposed area (BLM 2022).

Japanese American and Minidoka-connected communities have expressed concern regarding the following:

- Disproportionally impacting historic sites associated with their communities
- Siting the project in proximity to the nationally significant Minidoka NHS given the Japanese American and Minidoka-connected communities' concerns and sensitivities associated with impacts related to development in the surrounding area
- Honoring the place of Japanese Americans in national history

- Maintaining the wide open views of the landscape as would have been experienced at the time of Minidoka WRC incarceration
- Prominent project structures and their lighting visually impacting Minidoka NHS

Comments received during public scoping pointed to "America's changing commemorative landscape," which is described as a growing trend in governmental and societal actions aimed at making America's commemorative landscape more inclusive and reflective of America's rich and diverse heritage and to tell the whole story, including the stories of Japanese Americans and the AANHPI community. Evidence of this trend is seen in recent Presidential proclamations and direction from Congress through authorizing legislation and annual appropriations bills; recent additions of sites and resources to national parks, memorials and museums; and the DOI's recent budget requests and Secretarial guidance. The following list of existing and future trends and actions provides examples of America's changing commemorative landscape that have, or will, contribute to beneficial effects for the Japanese American and Minidoka-connected communities.

- Recent governmental actions that contribute to America's changing commemorative landscape include the following:
  - The John D. Dingell, Jr. Conservation, Management, and Recreation Act of 2019, which ratified the Tule Lake National Monument, redesignated the Honouliuli National Historic Site, and authorized the NPS to study the Amache Relocation Center in Colorado as a new unit of the National Park System
  - Bipartisan legislation passed in 2022, which authorized the NPS to establish the Amache National Historic Site in Colorado as a new unit of the National Park System
- Many existing and ongoing commemorative events are centered around the Minidoka NHS and Minidoka-connected communities and serve to engage and be led by the Japanese American and Minidoka-connected communities while also providing opportunities for remembrance, education, healing, sharing stories, and connecting the Japanese American diaspora and multiple generations. These events are as follows:
  - Events sponsored by the Minidoka Pilgrimage Planning Committee and the Japanese American Citizens League at "Camp Harmony" in Puyallup, Washington
  - Commemorative events sponsored by the Friends of Minidoka and Japanese American Citizens League in Idaho
  - Commemorative events at Bainbridge Island, Washington, to mark the forced relocation of the Bainbridge Island Japanese American community on March 30, 1942, sponsored by the Bainbridge Island Japanese American Exclusion Memorial Association and the Bainbridge Island Japanese American Community
  - Annual in-person pilgrimages to Minidoka NHS
- In 2006, Congress established the Japanese American Confinement Sites grant program (Public Law 109-441, 120 Stat. 3288) for the preservation and interpretation of incarceration sites where Japanese Americans were detained during WWII. The law authorized up to $38 million for the entire life of the grant program to identify, research, evaluate, interpret, protect, restore, repair, and acquire historic incarceration sites so that present and future generations may learn and gain inspiration from these sites and so that these sites can demonstrate the nation's commitment to equal justice under the law. Since the first appropriation in fiscal year 2009, the NPS has awarded 269 grants totaling more than $35 million. Past projects have included building rehabilitations, documentary films, and the development of educational curricula for educators. More than $3.4 million in grants were awarded in 2023 to preserve and interpret WWII Japanese American confinement sites (NPS 2023).

- Regional and national museums, which help tell the story of the Japanese American and AANHPI experiences during WWII, have received significant investments in recent years. In 2021, the Japanese American Museum of Oregon opened a new building in Portland, Oregon, with a focus on Oregon's Nikkei community and the WWII incarceration (Japanese American Museum of Oregon 2023). The Wing Luke Museum in Seattle, Washington, opened a special exhibit from 2022 to 2023 about the Japanese American incarceration during WWII (Wing Luke Museum 2023). In 2022, Congress passed legislation to authorize a commission to study the potential creation of a National Museum of Asian Pacific American History and Culture (U.S. Congress 2022).
- In their 2023 fiscal year budget, the NPS allocated funding for the rehabilitation of a non-historic maintenance facility at Minidoka NHS containing a carpentry shop, equipment repair bays, offices, and workspaces for park staff. The rehabilitation project is intended to support park operations and ensure the safety of park staff. The NPS also allocated funding for continued operations and maintenance of the Minidoka NHS visitor center to ensure the facility remains open for recreational access and enjoyment (NPS 2023).

Japanese American and Minidoka-connected communities consider impacts to the environmental setting an impact to their rights as a community, such as recognized under the following:

- EO 14031 (May 2021: Advancing Equity, Justice, and Opportunity for Asian Americans, Native Hawaiians, and Pacific Islanders)
- Department of the Interior Secretarial Order (SO) 3399 (April 2021: Department-Wide Approach to the Climate Crisis and Restoring Transparency and Integrity to the Decision-Making Process)
- Public Law 109-441 (December 2006: Preservation of Historic Confinement Sites)
- Public Law 110-229, as amended (May 2008: Establishment of Minidoka National Historic Site)
- Public Law 100-383 (1988: Congress Apologizes for the Relocation of Japanese Americans during World War II)
- Presidential Proclamation 7395 (2001: Establishment of the Minidoka Internment National Monument)
- Proclamation 10341 (February 2022: Day of Remembrance of Japanese American Incarceration During World War II)

3.20.3.3 Minidoka NHS Interpretive Purpose

As described in BLM (2022a), geographically dispersed environmental justice populations who do not reside in the analysis area can still be affected by actions on BLM public land if those populations use or depend on resources in the analysis area. Dispersed environmental justice populations were therefore considered in Section 3.6.1 (Environmental Justice Communities) analyses. Through scoping, Japanese American and Minidoka-connected communities were identified as having interests and concerns associated with the Minidoka NHS and the area encompassing the original Minidoka WRC. The potential impacts to these communities are described in detail in Section 3.6.1.2.

All turbine siting corridors are outside of the Minidoka NHS for all alternatives in this analysis. Some alternatives include turbine siting corridors within what was the original 34,000-acre Minidoka WRC, and the up-to-2.2-mile auditory APE (see EIS Section 3.5) would overlap the Minidoka NHS. As described elsewhere in Section 3 of this EIS, the area that was the original Minidoka WRC landscape is now dominated by sagebrush steppe, irrigated agriculture, and development. The topography is relatively flat and covered with many native and nonnative grasses, several species of sagebrush, yellow and rubber rabbitbrush, and perennial bunchgrass and herbaceous flowering plant species. Primary existing land uses are open range livestock grazing, center pivot-irrigated crop operations, low-density single-family residences, and ancillary facilities associated with agricultural uses. These landscape components, both natural and human made, contribute to the overall character, setting, and feel of the former 38,000-acre Minidoka WRC area and surrounding region as they exist today. At Minidoka NHS, the cultural landscape, viewshed, and soundscape are fundamental resources associated with the incarceration period (1942–1945); fundamental resources and values are essential to the NPS's achievement of the existing park's purpose and in maintaining the park's significance (NPS 2023a).

The NPS has identified the following as areas of fundamental resources and values for Minidoka NHS: historic structures, cultural landscapes, and archeological resource; environmental setting; museum collections; cultural traditions; commemoration and healing; public understanding, education, and involvement; memorial at Bainbridge Island; and cultural landscape at Bainbridge Island (NPS 2016). These fundamental resources and values are closely related to the park's legislative purpose and help focus planning and management of the park unit, i.e., identifying interpretive themes (NPS 2016). The visual landscape and soundscape surrounding Minidoka NHS contribute to aspects of these fundamental resources and values but because these resources are located outside of the park unit, there are aspects of these that are not managed by the NPS. Specifically, elements of the environmental setting; commemoration and healing; and public understanding, education, and involvement rely on the rural setting located beyond today's park unit boundaries.

The NPS describes these fundamental resources and values as follows (NPS 2006, 2016).

Environmental Setting: Minidoka's remote location in the high desert of Idaho provides an immersive setting that is fundamental to the visitor experience. Views of open fields and distant mountains create a sense of isolation on a vast landscape where Minidoka once stood. Built in 1909, the North Side Canal was constructed as a main irrigation canal from the Snake River, bringing water for agricultural production to the region and influencing the layout of Minidoka. The smell of high desert sagebrush contributes to this environmental setting. Extreme changes in temperature, the arid environment, and high winds that the people at Minidoka experienced are part of the environmental setting that are felt today. Experiencing this environmental setting allows visitors to better understand and connect to the daily lives at Minidoka. (NPS 2016)

Commemoration and Healing: Minidoka and the Bainbridge Island Memorial provide places for engagement, reflection, and healing. These sites provoke connections to individuals affected by the World War II exclusion, forced removal, and unjust incarceration, and serves to commemorate those who survived this difficult chapter of American history. (NPS 2016)

Public Understanding, Education, and Involvement: Educating and engaging the public in understanding the history of the incarceration of Japanese Americans during World War II, the fragile nature of civil rights, and the need to protect civil and constitutional rights in the United States is essential to both Minidoka and the Bainbridge Island Memorial. Working with partner groups, including the Friends of Minidoka, Bainbridge Island Historical Museum, and Denshō Project, is important to achieving goals of fostering public awareness and support for Minidoka National Historic Site. At Minidoka, special events such as the pilgrimage and the civil liberties symposium connect the public to the history that occurred here and its significance today. The Bainbridge Island Memorial is adjacent to a large urban population, providing an ideal location to promote greater public understanding, education, and involvement. (NPS 2016)

The NPS has also identified post-World War II homesteading as an important resource and value but also identifying that it wasn't fundamental to the purpose of the park (NPS 2016). The Post-World War II Homesteading resources within the park unit are part of the cultural landscape at the Minidoka NHS and the surrounding agricultural landscape also provides context concerning homesteading contributes to the setting.

Within Minidoka NHS, the Visitor Center (KOP 1), restored Block 22 Barracks (KOP 2), and Honor Roll (KOP 16) are areas often viewed by visitors, including survivors, descendants of survivors, and members of the general public. In these and other locations open to the public, the remote agricultural setting can be viewed. The existing visual conditions (i.e., values) that relate to landscape components, both natural and humanmade, contribute to the overall visual character associated with an area of land and are expressed through the BLM VRI process. Within the immediate foreground (0 to 2 miles) from these KOPs, a viewer would experience elements of NHS including historic buildings, foundations, and irrigation canals; the rural agricultural setting with fields, modern irrigations systems, and dispersed residences; and infrastructure including roads, electrical transmission lines, and electrical distribution lines. In the foreground (2 to 10 miles), the viewer would experience views of the adjacent landscape, varying with the viewers' orientation, that provides context of the landforms and rural character surrounding Minidoka NHS. Looking beyond the foreground into the middleground (10-20 miles) and the background (beyond 20 miles) the viewer would experience views of the larger landscape with details hidden by distance, topography, or intervening infrastructure, but also seeing mountains and opens skies at long distances. Additionally, in the nighttime, according to NPS (2006:186–187), although located in a relatively sparsely populated area where the night sky can be viewed, various existing sources of artificial light impact Minidoka NHS night skies. These include primarily yard lights (which illuminate the areas around many of the houses, barns, and driveways on the surrounding private lands) and the occasional automobile headlights.

Because of its agricultural setting, Minidoka NHS exhibits *natural quiet*, referring to having only natural sources of sound for short periods of time; although it is frequently subject to human-caused background noise, including from traffic on Hunt Road, farm machinery operating in adjacent fields, and overflights by aircraft (NPS 2006:186). The acoustic environment is an important component of the natural and cultural resources at Minidoka NHS and has its own intrinsic value (NPS 2015). As described in EIS Section 3.6.1 (Environmental Justice Communities), existing noise levels (including the average existing sound level with the influence of humanmade sounds) at Minidoka NHS were modeled by the NPS in 2015 and are predicted to be approximately 32 dBA or 6.0 dBA above the natural ambient sound level (which is approximately 26 dBA and includes noise generated from natural sources only) (NPS 2015). As discussed in EIS Section 3.5.5.1 the landscape setting and character of Minidoka NHS and auditory environment are key components of the visitor and survivor experience of remoteness, isolation, abandonment, and injustice for the Japanese Americans who were incarcerated at the site.

Minidoka NHS is a site of conscience, As stated in the Minidoka NHS foundation document (NPS 2016), "commemoration and healing" and "public understanding, education, and involvement" are fundamental values of Minidoka NHS.

3.20.3.3.1 THE STORY OF THE RELOCATION

Minidoka NHS offers the opportunity to interpret the results of the war hysteria following Japan's December 7, 1941, attack on Pearl Harbor and the failure of political leaders to publicly speak out against the unwarranted and illogical fear, prejudice, and subsequent incarceration of loyal United States citizens of Japanese ancestry and legal resident aliens (NPS 2013). Visitors to Minidoka NHS approach the site through agricultural lands with open views. The entry experience emphasizes the remote and isolated location experienced by incarcerees as they arrived after having been unconstitutionally taken from their homes in the Pacific Northwest and coastal Alaska. The guard tower and barbed wire at the entry prompt the visitor to reflect on the civil and constitutional rights violations these loyal citizens experienced. The

Minidoka NHS Honor Roll (KOP 16) is a short walk from this entry point and provides the first viewing experience to many site visitors.

Table 1 in NPS (2006) identifies management recommendations for education and interpretation and visitor experience. The education and interpretation management recommendations include illustrating "the loss of freedom and civil liberties [through] the military police building, reception building, sense of remoteness, and historic locations of the fence and guard tower" and providing "a forum for . . . the broader story, and the relevance of these stories to today" (NPS 2006:61). The visitor experience management recommendations include providing opportunities for visitors in the historic entrance area (Figure 3.20-1) to experience "a strong sense of arrival and transition experience," that is "carefully designed to be compatible with the historic setting" (NPS 2006:61).

The incarcerees' story of relocation is conveyed when visitors view the current setting (especially when compared to the lush green coastal areas from which the incarcerees were unconstitutionally extracted), feel the sense of isolation described by those brought to Minidoka, and discover the line from freedom to confinement while entering the historic entrance.

3.20.3.3.2 LIVING CONDITIONS

Tangible Minidoka NHS resources (for example NPS historic features, views, the cultural landscape, and collection systems) help communicate key concepts, stories, ideas, or messages and help visitors relate to broader universally understood concepts (e.g., time, struggle, conservation, prejudice, and justice). Figure 3.20-2 shows the layout of the original Minidoka WRC incarceration site. Throughout site operation, 9,000 people were incarcerated at a time on less than 950 acres, living and eating in buildings like the ones shown in Figures 3.20-8 and 3.20-9, the restored Block 22 Barracks (KOP 2). Figure 3.20-3 shows the reconstructed perimeter fence near the North Side Canal[10] serving as a symbol of the incarcerees' confinement. Baseball fields like the one shown in Figures 3.20-4 and 3.20-5 (from KOP 1, the Minidoka NHS Visitor Center) were built by the incarcerees while guards watched; playing baseball brought some sense of normalcy to incarcerees' lives. NPS (2006) discusses the surrounding environs of Minidoka NHS as observed at that time, noting that some visual and scenic qualities of the landscape are consistent with the historic rural landscape character during WWII (NPS 2006:191). Aside from the existing transmission line (authorized in 1965), the lack of further development supports the visual elements fitting the historic context of Minidoka and allows for views of the surrounding agrarian landscape (see Figure 3.20-4). At the time of publication of NPS (2006), there was no adjacent development that was out of character or that otherwise would disrupt the significant long views of the surrounding landscape (i.e., those views of the landscape beyond the confines of Minidoka WRC that would have been experienced by incarcerees). These include views to farms, geological features, and distant mountains. Although most WWII features of Minidoka WRC have since been removed, scattered buildings, foundations, pathways, water works, garden plots, and artifact concentrations remain, such as the NRHP-eligible Minidoka WRC Landfill (NPS 2007).

Table 1 in NPS (2006) identifies management recommendations for education and interpretation and visitor experience. The education and interpretation management recommendations include providing a focus "related to the [North Side Canal], such as the historic perimeter fence [and] sense of confinement" (NPS 2006:61). The visitor experience management recommendations include providing opportunities for

[10] This interpretive sign is part of the Minidoka NHS trail near the North Side Canal. Incarcerees found peace spending time near the canal listening to the water and watching birds or fishing. As described on the sign, during the WWII incarceration at Minidoka WRC, incarcerees laboring in adjacent agricultural lands had to walk longer distances to exit the Minidoka WRC to access fields and the contractor that built the fence inhumanely electrified the fence without administrators knowing. Although the fence electricity was shut off, armed guards patrolled the Minidoka WRC perimeter and incarcerees understandably resented their unconstitutional incarceration.

"individual contemplation and personal reflection," and "a place to observe and interpret the full viewshed of the [incarceration site], including the extents of the historic residential housing blocks" (NPS 2006:61).

Incarceree living conditions are conveyed when visitors:

- view the current setting and specifically how it looked historically through camp construction and deconstruction and how it looked immediately following WWII when homesteaded by WWII veterans (excluding Japanese American veterans);
- feel the sense of isolation described by those incarcerated at Minidoka;
- understand the extent of Minidoka's WWII farm operations;
- learn about what daily life was like for the inhabitants of Minidoka and the surrounding communities they helped or who helped those incarcerated during WWII;
- see original and restored camp structures on-site; and
- walk along historic camp pathways in the preserved cultural landscape.

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Figure 3.20-1. Minidoka National Historic Site entrance sign near the historic guard tower.

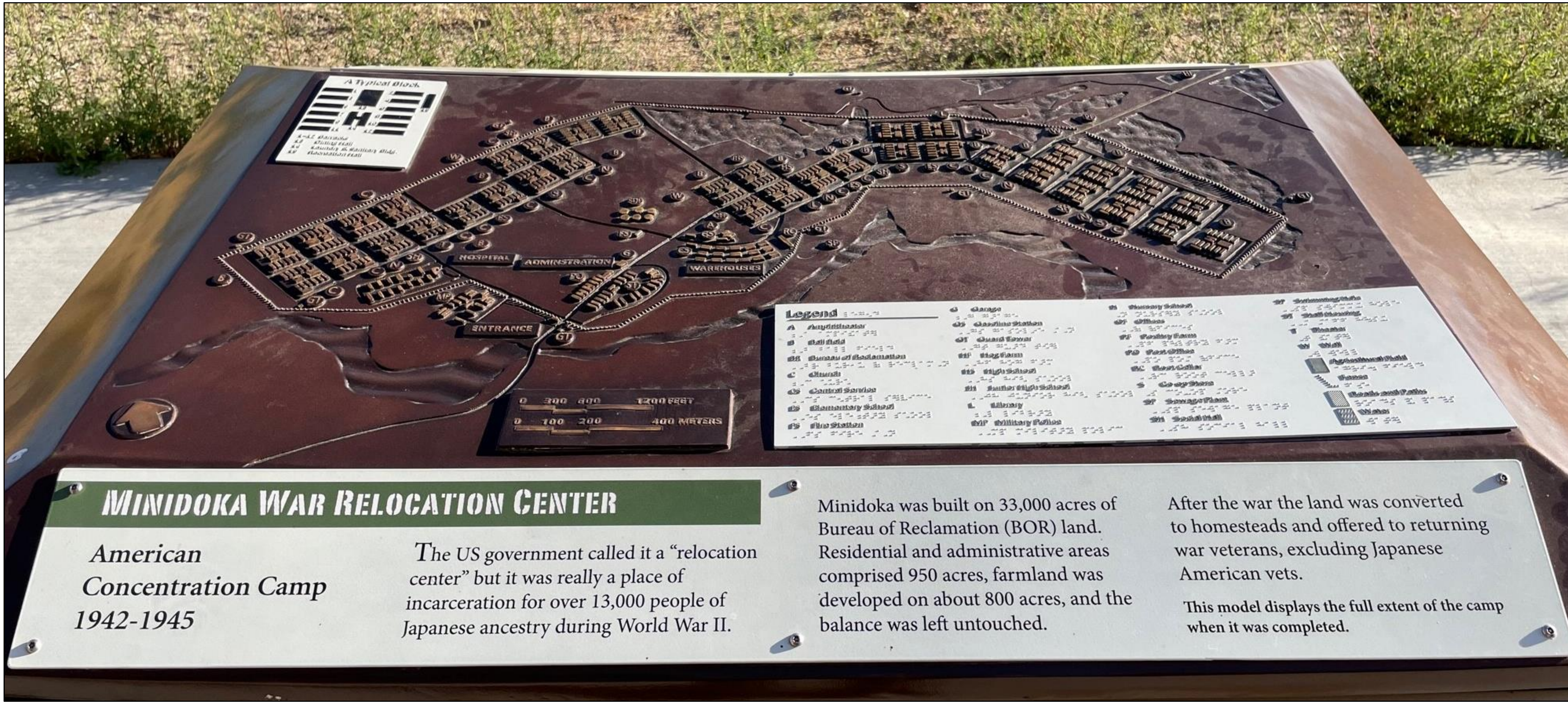

Figure 3.20-2. Minidoka War Relocation Center: layout of the incarceration site.

Figure 3.20-3. Minidoka National Historic Site reconstructed perimeter fence.

Figure 3.20-4. Visual resources KOP 1 (Baseball Field at the Minidoka NHS Visitor Center): existing viewing condition.

Figure 3.20-5. Visual resources KOP 1 (Baseball Field at the Minidoka NHS Visitor Center): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

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3.20.3.3.3 THE WORK PERFORMED

One of the reasons the Minidoka WRC was located in the Snake River Valley was because the War Relocation Authority saw the potential for Japanese Americans to be employed in land development that supported the Bureau of Reclamation's mission to promote homesteading across the West; this provided cheap labor for land development, such as irrigation and settlement. "[Incarcerees] cleared desert vegetation, built irrigation canals, and effectively transformed the arid landscape into irrigated agricultural fields in and around" Minidoka (NPS 2006:168), and the present-day agricultural character of the area is the legacy of their labor during WWII (NPS 2006:54, 2016:17). After WWII, the lands and structures that once housed incarcerees became homesteads and farm buildings, and current land use patterns and structures are "reminders of the agricultural traditions introduced by incarcerees and post-WWII land lottery recipients" (NPS 2013:53). Therefore, the irrigated fields and agricultural landscape remain as an enduring legacy of the unconstitutionally incarcerated Nikkei communities that labored at Minidoka WRC. A central characteristic of the integrity and historical significance of Minidoka NHS is its setting in a remote and open expanse of agricultural fields northeast of Twin Falls, Idaho (NPS 2021). This setting is visible from the three KOPs located at the Visitor Center, restored Block 22 Barracks, and Honor Roll (KOPs 1, 2, and 16) and other locations within Minidoka NHS accessible to the public.

Table 1 in NPS (2006) identifies management recommendations for education and interpretation and visitor experience. The education and interpretation management recommendations include providing "a connection to the rich agricultural history of the area" (NPS 2006:61). The visitor experience management recommendations include providing opportunities for visitors to "observe and interpret . . . the outlying open and expansive high desert environment" (NPS 2006:61). These management recommendations help visitors understand how incarcerated Japanese Americans brought irrigation (and subsequent agriculture) to this arid landscape.

The work performed by incarcerees is conveyed when visitors:

- view the existing setting, specifically how it looked immediately following WWII when homesteaded by WWII veterans (excluding Japanese American veterans);
- understand the extent of Minidoka's WWII farm operations;
- learn about what daily life was like for the inhabitants of Minidoka WRC and the surrounding communities they helped; and
- walk along the reconstructed perimeter fence and learn of the incarcerees' experience having to exit and reenter the incarceration site each day as they went to perform agricultural work.

3.20.3.3.4 CONTRIBUTIONS TO THE MILITARY

When compared to other similar camps "disproportionately large numbers of Minidoka men and women volunteered for the military" (NPS 2006:96). In 1943, Roosevelt established an all–Japanese American unit and called for volunteers from the War Relocation Authority centers. The Minidoka NHS Honor Roll (KOP 16, shown in Figures 3.20-6 and 3.20-7) lists the names of 1,000 loyal Japanese American citizens who served in the American armed forces during WWII (NPS 2006:35). While serving for the U.S. military in WWII, Japanese American soldiers would visit their incarcerated families at Minidoka WRC (NPS 2006). As noted on Figure 3.20-2, after WWII ended, Minidoka WRC and its agricultural lands were converted to homesteads and were offered to returning war veterans, excluding Japanese American veterans.

Table 1 in NPS (2006) identifies management recommendations for education and interpretation and visitor experience. The education and interpretation management recommendations include providing in the entrance area, discussion of “the historic features as symbols of the internment and incarceration,” interpretation of “the loss of freedom and civil liberties,” and “the contradiction of loyal citizens being imprisoned” (NPS 2006:61). The visitor experience management recommendations include providing opportunities for “individual contemplation and personal reflection” (NPS 2006:61), especially at the Honor Roll where visitors can reflect on the contradiction of loyal Japanese American citizens serving the United States after being unconstitutionally incarcerated and while their families remained incarcerated for the duration of WWII.

Incarceree contributions to the military are conveyed when visitors discover the line from freedom to confinement while entering the historic entrance, see original camp structures where individuals lived before serving in the military and where soldiers’ families remained incarcerated, and contemplate and reflect at the Honor Roll.

Figure 3.20-6. Visual resources KOP 16 (Honor Roll at the Minidoka NHS): existing viewing condition.

Figure 3.20-7. Visual resources KOP 16 (Honor Roll at the Minidoka NHS): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

Figure 3.20-8. Visual resources KOP 2 (restored Block 22 Barracks at the Minidoka NHS): existing viewing condition.

Figure 3.20-9. Visual resources KOP 2 (restored Block 22 Barracks at the Minidoka NHS): simulated worst-case viewing condition under the Preferred Alternative (with 5-MW turbines).

APPENDIX 15

Issues Analyzed in Detail and Determined to Not Have Significant Impacts

CONTENTS

Figures

Tables

INTRODUCTION

This appendix provides a full analysis of issues analyzed in detail and determined to either not have significant impacts or impacts that could be mitigated to less than significant. The information in this appendix was not included in the main body of the final environmental impact statement (EIS) for two reasons:

- To be consistent with the National Environmental Policy Act (NEPA)'s direction to focus an EIS on significant environmental issues.[1]
- To comply with the recently enacted amendments to the NEPA via the Fiscal Responsibility Act of 2023, which limit an "extraordinarily complex" EIS to 300 pages, not including any citations or appendices (42 United States Code [USC] 4336a(e)(1)(A)–(B)). The BLM determined that because of the size, scope, and scale of the proposed agency action, the Lava Ridge Wind Project EIS is extraordinarily complex.

Through the analysis in this appendix, the Bureau of Land Management (BLM) concluded that the action alternatives would not significantly impact the resources and issues analyzed in detail. Per 40 Code of Federal Regulations (CFR) 1502.3.(b), *significance* was defined by the BLM as follows:

> (1) In considering the potentially affected environment…as appropriate to the specific action, the affected area (national, regional, or local) and its resources…
>
> (2) In considering the degree of the effects…as appropriate to the specific action:
>
> > (i) Both short- and long-term effects.
> >
> > (ii) Both beneficial and adverse effects.
> >
> > (iii) Effects on public health and safety.
> >
> > (iv) Effects that would violate Federal, State, Tribal, or local law protecting the environment.

In this appendix, Analysis Approach tables define the potentially *affected area* as each issues' analysis area and provides an impacts duration for the consideration of whether the effects would be short or long term. The Impacts section for each issue analyzed considers whether the effects that would occur would be beneficial or adverse, affect public health and safety, or violate any laws protecting the environment.

Because these sections were originally part of Chapter 3 of the draft EIS, chapter and section naming and numbering were maintained for navigational simplicity. All abbreviations and references for these sections are provided in the main body of the EIS and EIS Appendix 10, respectively.

[1] 40 CFR 1502.1: An EIS "shall provide full and fair discussion of significant environmental impacts and shall inform decision makers and the public of reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data."

3.2 AIR QUALITY

3.2.1 Construction Air Quality and Air Quality–Related Values

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.2-1.

Table 3.2-1. Analysis Approach for Construction Air Quality and Air Quality–Related Values

Issue Analyzed in Detail	How would criteria pollutants, hazardous air pollutants (HAPs), and fugitive dust created during construction, decommissioning, and reclamation affect air quality, including air quality–related values (AQRVs) at Class I areas or non-attainment areas?
Analysis Area	Because of the nature of air pollutants, which become more spread out as they travel away from a source of pollution, the air quality analysis area for all project phases (see also Section 3.2.2 [Operation Air Quality and Air Quality–Related Values]) extends approximately 31 miles (50 kilometers [km]) in all directions beyond the siting corridors (Figure 3.2-1). A 31-mile (50-km) radius was chosen to be consistent with minimum air quality analysis required for major source air quality permitting. However, impacts to AQRVs and analyses are often conducted for sources well beyond the 50-km radius.
Indicators	Emission estimates for regulated pollutants that exceed applicable regulations Project emission estimates that exceed county emission inventories
Impacts Duration	The up-to-3-year construction and decommissioning phases of the project.
Data Sources	The National Oceanic and Atmospheric Administration catalogs meteorological and climatological data from weather stations across the United States, including stations near the analysis area. • The National Emissions Inventory is a detailed annual estimate of criteria pollutants and HAPs from air emission sources. Data are collected from state, local, and Tribal air agencies and supplemented with data from the U.S. Environmental Protection Agency (EPA) (EPA 2020). The National Emissions Inventory includes estimates of emissions from many sources, including point sources, nonpoint sources, on-road sources, non-road sources, and event sources. When combined, the emission estimates from these sources create as complete an inventory as possible. (Criteria pollutants are pollutants that have an established a National Ambient Air Quality Standard (NAAQS). HAPs are pollutants that are known or suspected to cause cancer or other serious health effects.)
Assumptions or Approach	Emissions estimates for the project were conducted using the following: • Off-road and on-road vehicle and equipment emissions were estimated using the latest version of the EPA's Motor Vehicle Emissions Simulator (MOVES3) factors for Jerome County, Idaho, based on maximum summer or winter emission factors for calendar years 2023 and 2024 (EPA 2022d). Construction-related emissions for wind projects are primarily associated with the exhaust from heavy equipment (cranes, backhoes, bulldozers, graders, rollers, gensets), delivery and haul trucks (cement trucks, heavy-duty trucks), and construction worker vehicles getting to and from the site; helicopters; concrete batch plants; blasting; and fugitive dust from site preparation, land clearing, material handling, and equipment movement on unpaved areas. • Operating times for the equipment were based on a 7-day workweek and up to a 10-hour workday, depending on the type of equipment and activity, during which the equipment could be operating over the up-to-3-year construction and decommissioning phases. • Emissions associated with on-road motor vehicles used for security, escorting and project management, and personal employee vehicle trips were based on a travel distance of 65 miles from Twin Falls, Idaho. Delivery vehicle trips were based on a travel distance of 43 miles from the nearest rail station in Minidoka, Idaho. On-road truck trips, including concrete and water trucks, were assumed to travel 16 miles from the staging yards per day per truck. Paved and unpaved emissions were estimated using EPA's Compilation of Air Pollutant Emission Factors (AP-42) (EPA 1995). The breakdown of paved vs. unpaved were obtained from geographic information systems (GIS) calculations. The total trips for the construction phase were taken from MVE (2023). Emissions from diesel-fired generators were included. The diesel-fired generator emissions were based on twenty 100-kilowatt units (total equivalent of 2,682 horsepower) operating 10 hours per day, every day, for the duration of the up-to-3-year construction and decommissioning phases. • Emissions from the three concrete batch plants were estimated using the Texas Commission on Environmental Quality's calculation workbook for concrete batch plants (Texas Commission on Environmental Quality 2020). • Blasting emissions were estimated assuming two blasts per day for 525 days assuming 120 pounds of ammonium nitrate-fuel oil per blast using AP-42 Explosive Detonation factors.

	• Fugitive dust emissions can result from the following activities: grading, moving soil, digging, loading, and unloading of trucks, moving trucks on unpaved surfaces, and wind erosion of stockpiles. A controlled fugitive dust emission factor from the WRAP Fugitive Dust Handbook (Countess Environmental 2006) was used. It was assumed that 10% of the siting corridors would be disturbed per construction month. Particulate matter smaller than 2.5 microns in aerodynamic diameter (PM2.5) was assumed to be 10% of particulate matter smaller than 10 microns in aerodynamic diameter (PM10). The controlled fugitive dust emission factor includes a control efficiency of 50% due to daily watering. • Decommissioning emissions were estimated for both off-road and on-road vehicles and equipment using MOVES3 emission factors (EPA 2022d). Emissions are similar to that of construction, but with smaller rosters of vehicles and equipment and absent any need for concrete and blasting.

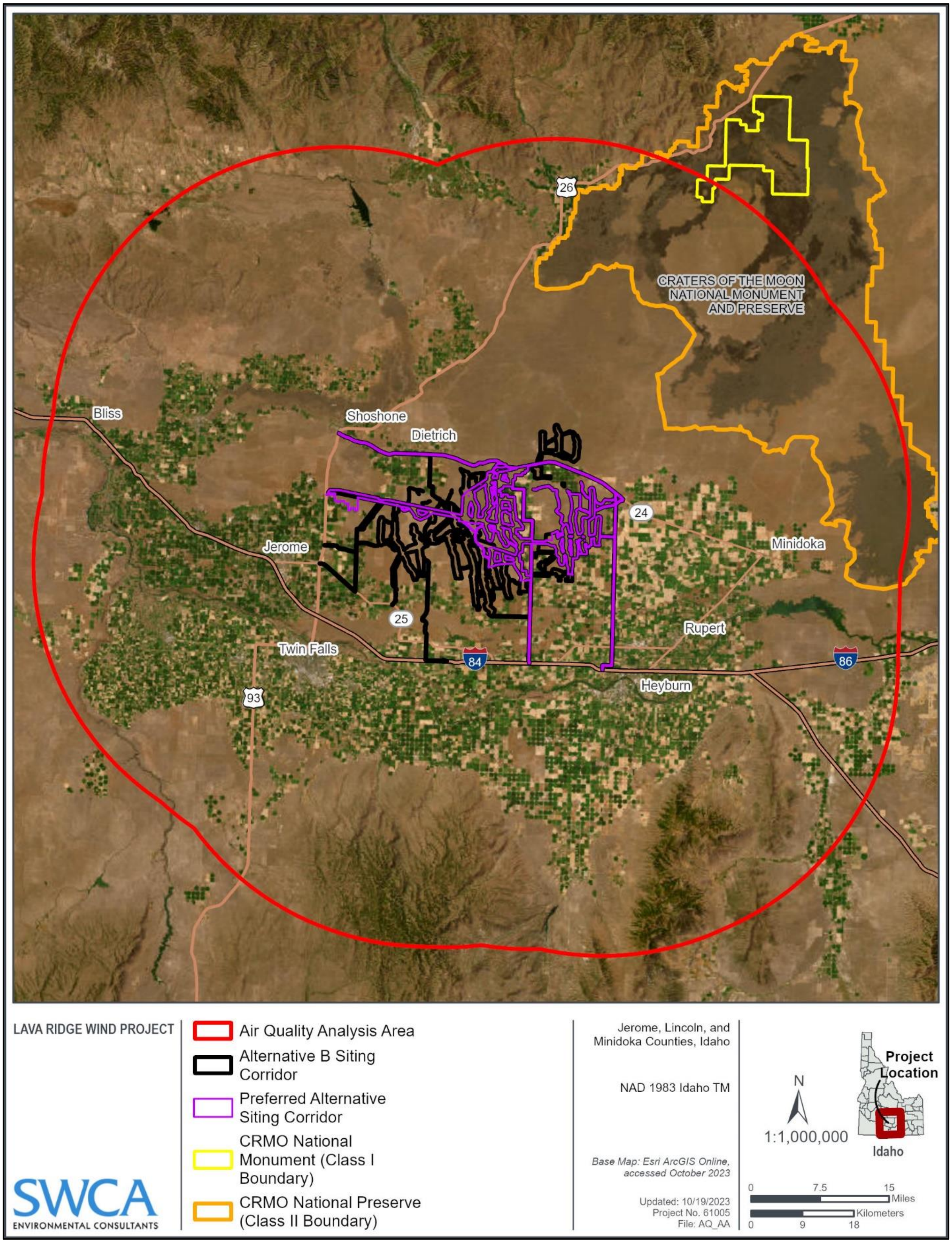

Figure 3.2-1. Air quality analysis area.

3.2.1.1 Affected Environment

The primary factors that influence regional air quality are the locations of air pollution sources, the quantity and chemical characteristics of the pollutants emitted by those sources, the topography of the region, and the local meteorological conditions.

3.2.1.1.1 REGULATORY BACKGROUND

Air quality within a region is typically measured in comparison to the NAAQS, which are set by the EPA Office of Air Quality Planning and Standards in accordance with the Clean Air Act (CAA) (42 USC 7409) for criteria pollutants. The EPA has established NAAQS to limit the amount of air pollutant emissions considered harmful to public health and the environment. There are two forms of NAAQS (EPA 2022a). The *primary* standards are designed to provide an adequate margin of safety essential to protecting public health. The *secondary* standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of a criteria pollutant in the ambient air. The EPA has set air quality standards for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), PM_{10}, $PM_{2.5}$, ozone (O_3), and lead (Pb). The NAAQS are provided in Table 3.2-2.

Under the provisions of the CAA, any state can have requirements that are more stringent than those of the national program. Idaho does not have any separate ambient air quality standards (Idaho Administrative Code 58.01.01.107.03.b).

Table 3.2-2. National Ambient Air Quality Standards

Pollutant	Averaging Time	NAAQS Primary Standards	NAAQS Secondary Standards
CO	1 hour* 8 hours*	35 ppm 9 ppm	– –
Pb	3 months (rolling)†	0.15 µg/m³	Same as primary
NO_2	Annual‡ 1 hour§	0.053 ppm 0.100 ppm	Same as primary –
O_3	8 hours¶	0.07 ppm	Same as primary
PM_{10}	24 hours#	150 µg/m³	Same as primary
$PM_{2.5}$	24 hours** Annual††	35 µg/m³ 12 µg/m³	Same as primary 15 µg/m³
SO_2	1 hour‡‡ 3 hours§§	0.075 ppm –	– 0.5 ppm

Source: EPA (2022a).

Notes: µg/m³ = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion.

* Not to be exceeded more than once per year.

† Not to be exceeded.

‡ Annual mean.

§ The 3-year average of the 98th percentile of the daily maximum 1-hour average must not exceed this standard.

¶ The 3-year average of the 4th highest daily maximum 8-hour average O_3 concentration measured at each monitor within an area over each year must not exceed this standard.

\# Not to be exceeded more than once per year on average over 3 years.

** The 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed this standard.

†† The 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed this standard.

‡‡ The 3-year average of the annual 99th percentile of the 1-hour daily maximum must not exceed this standard.

§§ Not to be exceeded more than once per year.

The EPA assigns classifications to geographic areas based on monitored ambient air quality conditions. Areas that meet the standards of a pollutant subject to NAAQS are classified as being in attainment for that pollutant. Areas that do not meet the NAAQS for a pollutant are designated as being in non-attainment for that pollutant. Areas that cannot be classified based on available information for a pollutant are designated as being unclassified. An area's attainment status is designated separately for each criteria pollutant; one area could have all three classifications. If a region is designated as non-attainment for an NAAQS, the CAA requires the state to develop a state implementation plan. A state implementation plan provides for the implementation, maintenance, and enforcement of the NAAQS and includes emission limitations and control measures to attain and maintain the NAAQS.

The project is in Jerome, Lincoln, and Minidoka Counties in Idaho. All three counties have been classified by the EPA as being in attainment for all criteria pollutants for which there are NAAQS (EPA 2022b).

The General Conformity Rule under the CAA Section 176(c)(4) applies to all federal actions that take place in areas designated as non-attainment or maintenance. The rule establishes a threshold for determining if actions will have significant impacts to air quality. Since Jerome, Lincoln, and Minidoka Counties are in attainment for all criteria pollutants, the General Conformity Rule does not apply.

The Prevention of Significant Deterioration (PSD) is a CAA permitting program for new major sources or major modifications of existing sources of air pollution that are in attainment areas. PSD is designed to protect public health and welfare and to preserve, protect, and enhance the air quality in national parks, wilderness areas, monuments, and other areas of special value. The program applies to new (or modified) major stationary sources in attainment areas; major sources are defined as those sources that emit 100 tons per year or more of any criteria pollutant for specifically listed source categories or that emit 250 tons per year of any criteria pollutant and are not in a specifically listed source category.

Under PSD regulations, the EPA classifies airsheds as Class I, Class II, or Class III. Class I areas are areas where almost no change from the existing current air quality is allowed. These are areas of special national or regional natural, scenic, recreational, or historic value, for which PSD regulations provide special protection. Moderate pollution increases and reasonable growth are allowed in Class II areas, but stringent air quality constraints are desired when a PSD Class II baseline is triggered. In Class III areas, substantial industrial or other growth is allowed, and increases in concentrations up to the NAAQS are considered insignificant. No Class III areas have been designated to date; therefore, all areas not designated as Class I areas are known as Class II areas.

In 1999, the EPA announced an effort, known as the Regional Haze Rule (EPA 2001), to improve air quality and visibility in 156 national parks and wilderness areas designated as Class I areas. Regional haze reduces long-range visibility over a wide region. Section 169A of the CAA sets forth a national goal for visibility. The rule requires states to demonstrate reasonable progress toward the "prevention of any future, and the remedying of any existing, impairment in Class I areas which impairment results from manmade air pollution."

AQRVs are resources, as defined by Federal Land Managers (FLMs), that may be adversely affected by a change in air quality and include visibility (either regional haze or plume impairment) and sulfur and nitrogen deposition. The FLMs' AQRV Work Group (FLAG) issued a guidance document for the methodology and AQRV criteria used to evaluate adverse impacts (USFS et al. 2010). This guidance and associated screening thresholds were developed primarily for Class I areas. The guidance recommends an analysis of visibility impairment (i.e., plume blight) at Class I areas within 50 km of a federal action. In this case, the siting corridors are approximately 46.1 km from a Class I area, the national monument portion of Craters of the Moon National Monument and Preserve (CRMO) (hereafter the National Monument).

At the request of the NPS, an additional Class II area was evaluated against Class I thresholds; this area is the national preserve portion of CRMO (hereafter the National Preserve) located approximately 15.2 km east of the siting corridors. Since the AQRVs only have screening thresholds below which no concern exists, rather than regulatory standards, AQRV impacts are typically evaluated on a case-by-case basis by FLMs. As part of the impact evaluation, the FLMs consider such factors as magnitude, frequency, duration, location, geographic extent, timing of impacts, and current and projected conditions of AQRVs. In practice, this methodology often results in the need to place AQRV impacts into context.

The Interagency Monitoring of Protected Visual Environments (IMPROVE) program was initiated in 1985 to establish current visibility conditions and trends in national parks and wilderness areas. The CRMO IMPROVE station was used for characterization of the baseline regional haze level in the analysis area using data from 2010 to 2019. Over that time period, the standard visual range has remained unchanged (IMPROVE 2022).

3.2.1.1.2 STATE LAWS, REGULATIONS, POLICIES, AND PLANS

The project would require air quality permits from the Idaho Department of Environmental Quality Air Quality Division. Appropriate emission control equipment would be installed and operated in accordance with the construction and operating air permits.

3.2.1.1.3 METEOROLOGY AND CLIMATE

The region in which the analysis area is located has a semi-arid climate with cold, snowy winters and warm summers. Precipitation is evenly spread throughout the year in this region. Table 3.2-3 summarizes weather conditions from Twin Falls, Idaho, near the siting corridors.

Table 3.2-3. Weather Conditions for Twin Falls, Idaho

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high in degrees Fahrenheit	37	43	52	61	70	79	88	87	77	65	48	38
Average low in degrees Fahrenheit	20	23	29	35	43	51	56	54	45	35	27	20
Average precipitation in inches	1.06	0.75	1.02	0.83	1.02	0.79	1.06	1.06	1.06	1.06	1.06	1.06

Source: U.S. Climate Data (2022).

Winds are predominantly from the west-southwest to the south-southwest. Figure 3.2-2 shows the distribution of wind directions and speeds near the siting corridors during 2021 (Midwestern Regional Climate Center 2022).

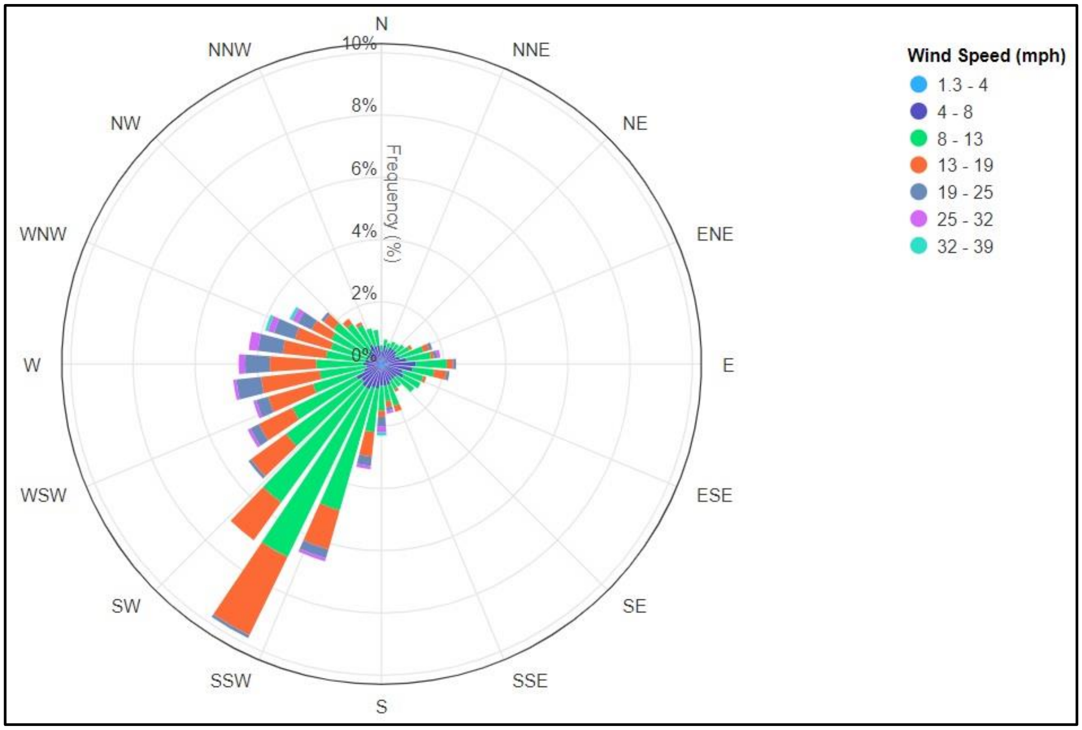

Figure 3.2-2. 2021 wind rose for Twin Falls Sun Valley Regional Airport, Idaho. (Source: Midwestern Regional Climate Center 2022.)

3.2.1.1.4 EMISSION INVENTORIES FOR COUNTIES IN THE ANALYSIS AREA

Emission inventories are useful in comparing emission source categories to determine which industries or practices are contributing to the general level of pollution in the three counties in the analysis area. Emission inventories provide an overview of the types of pollution sources in the area and the amount of pollution being emitted on an annual basis by those sources. For the purposes of this assessment, the most recent National Emissions Inventory conducted in 2017 was summarized for Jerome, Lincoln, and Minidoka Counties (Table 3.2-4).

Table 3.2-4. 2017 National Emission Inventory for Jerome, Lincoln, and Minidoka Counties, Idaho (tons per year)

Jerome County Sector	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_X	VOCs	HAPs
Agriculture	0.00	0.00	4,955.05	1,005.79	0.00	388.90	12.84
Biogenics*	491.51	420.92	0.00	0.00	0.00	1,451.42	445.73
Dust	0.00	0.00	9,420.02	907.87	0.00	0.00	0.00
Fires	585.51	18.45	69.83	55.51	6.68	131.80	50.60
Fuel combustion	332.76	82.91	101.04	91.63	4.97	40.12	11.08
Industrial processes	0.00	0.00	0.00	0.00	0.00	12.20	0.59
Miscellaneous†	10.14	0.24	6.35	5.73	0.04	736.93	89.19
Mobile	4,845.32	1,598.05	127.99	59.03	5.13	436.73	124.76
Waste disposal	32.41	1.57	7.45	6.61	0.35	8.02	5.10
Total	**6,297.65**	**2,122.15**	**14,687.74**	**2,132.16**	**17.17**	**3,206.12**	**739.89**

Lincoln County Sector	**CO**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**	**SO_X**	**VOCs**	**HAPs**
Agriculture	0.00	0.00	1,692.45	342.44	0.00	142.44	5.02
Biogenics*	787.06	638.55	0.00	0.00	0.00	2,329.77	713.10
Dust	0.00	0.00	4,236.59	409.04	0.00	0.00	0.00
Fires	3,283.39	93.27	377.29	319.16	39.35	786.96	317.52
Fuel combustion	91.33	11.45	19.59	18.44	0.85	13.00	2.78
Industrial processes	0.00	0.00	0.00	0.00	0.00	0.21	0.01
Miscellaneous†	1.92	0.03	1.63	1.47	0.00	124.90	17.58
Mobile	1,234.33	701.56	55.04	25.85	1.19	142.19	44.00
Waste disposal	8.29	0.52	2.40	2.16	0.09	1.80	1.41
Total	**5,406.32**	**1,445.37**	**6,385.00**	**1,118.57**	**41.48**	**3,541.27**	**1,101.42**
Minidoka County Sector	**CO**	**NO_X**	**PM_{10}**	**$PM_{2.5}$**	**SO_X**	**VOCs**	**HAPs**
Agriculture	0.00	0.00	4,985.47	999.45	0.00	90.00	13.81
Biogenics*	609.80	560.29	0.00	0.00	0.00	1,781.25	544.85
Dust	0.00	0.00	4,925.37	474.43	0.00	0.00	0.00
Fires	2,535.39	45.52	267.95	223.32	21.48	592.81	170.07
Fuel combustion	375.96	272.88	80.51	69.07	4.28	39.73	10.74
Industrial processes	2,532.71	142.35	197.42	102.35	11.59	149.08	82.44
Miscellaneous†	10.91	0.19	9.99	9.12	0.01	819.27	69.51
Mobile	3,254.43	1,032.72	93.79	44.05	2.62	335.79	98.44
Waste disposal	37.84	1.45	7.02	6.34	0.39	8.16	4.77
Total	**9,357.04**	**2,055.41**	**10,567.52**	**1,928.13**	**40.37**	**3,816.09**	**994.63**

Source: EPA (2020).

* Biogenic emissions are those emissions derived from natural processes (such as vegetation and soil).

† Miscellaneous categories include bulk gasoline terminals, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

VOCs = volatile organic compounds.

In all three counties, mobile sources contribute the most NO_X emissions, fires are the largest contributor of SO_X emissions, and biogenic sources are the largest contributor to volatile organic compounds (VOCs) and HAPs. Regarding CO emissions, mobile sources are the biggest contributors in Jerome and Minidoka Counties, whereas fires are the biggest contributor in Lincoln County. Dust is the largest contributor to PM_{10} emissions in Jerome and Lincoln Counties, whereas agricultural sources are the largest contributor of PM_{10} in Minidoka County. Agricultural sources are also the largest contributor of $PM_{2.5}$ emissions in Jerome and Minidoka Counties, but dust contributes the most to $PM_{2.5}$ emissions in Lincoln County.

3.2.1.1.5 AMBIENT AIR QUALITY

Monitored pollutant concentrations (also known as background concentrations) represent prevailing air pollution from existing sources in the region. Table 3.2-5 provides the background concentrations representative of the analysis area. These background concentrations were measured at the EPA monitoring locations nearest to the siting corridors between 2018 and 2021.

Table 3.2-5. Representative Background Concentrations for the Analysis Area

Pollutant	Averaging Time	Background Concentration (ppb)	Background Concentration (μg/m^3)	Data Source
CO	8 hours	1,600	801.4	Eastman Garage, Boise City, Idaho, 2018–2020 (highest 2nd high)
	1 hour	3,030	3,484.5	Eastman Garage, Boise City, Idaho, 2018–2020 (highest 2nd high)
NO_2	Annual	0.9	1.7	Washakie 2018–2020 (annual mean)
	1 hour	13.3	25.00	Washakie 2018–2020 (3-year averag^{e} 98th percentile)
PM_{10}	24 hours	–	57.0	Ballard Road 2017–2019 (3-year averag^{e} 98th percentile)
$PM_{2.5}$	Annual	–	4.3	Minidoka NHS 2018–2020 (annual mean)
	24 hours	–	14.5	Minidoka NHS 2018–2020 (3-year averag^{e} 98th percentile)
SO_2	3 hours	192.7	504.9	Pocatello sewage treatment 2018–2020 (highest 2nd high)
	1 hour	43.6	114.2	Pocatello sewage treatment 2018–2020 (averag^{e} 99th percentile)
O_3	8 hours	69.0	135.9	CRMO 2018–2020 (highest 4th high)

Source: EPA (2022c).
Note: ppb (parts per billion), μg/m^3 (microgram per cubic meter).

3.2.1.1.6 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions in and near the analysis area include population growth, which would increase overall mobile source emissions. There are several planned wind and solar energy development projects and transmission line projects in the analysis area. Notably, the Taurus Wind Project would be located immediately west of the project (potentially within 1 mile) and the Salmon Falls Wind Project would be approximately 30 miles south. Both of these projects would be of a similar size and scale to the Lava Ridge Wind Project and likely have similar types and quantities of emissions.

Additionally, as described in Section 3.4.1.1.1 (Existing and Future Trends and Actions) based on general climate trends in Idaho, the frequency of wildfire occurrence and severity is projected to increase (Runkle et al. 2022).

3.2.1.2 Impacts

3.2.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and air quality would only be affected by existing and future trends and actions.

3.2.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction activities from Alternative B would produce air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from the siting corridors, delivery truck exhaust, and fugitive dust from soil disturbance and travel on unpaved roads. Table 3.2-6 summarizes the estimated annual construction-related project emissions. Construction would last 2 years.

Table 3.2-6. Estimated Annual Project Construction Emissions (tons per year)

Category	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	VOC	HAPs
Off-road construction equipment	59.43	84.10	10.13	5.51	5.42	5.83	1.76
On-road construction equipment, worker commuting, and material delivery	58.40	39.80	0.08	449.83	48.41	3.32	0.70
Blasting construction activities	1.06	0.27	0.03	–	–	–	–
Fugitive dust from construction	–	–	–	691.02	69.10	–	–
Helicopter	4.51	13.42	0.88	0.88	0.88	0.22	0.02
Concrete batch plants	–	–	–	7.55	1.14	–	–
Total	**123.40**	**137.58**	**11.12**	**1,154.78**	**124.95**	**9.37**	**2.49**
Portion of annual construction emissions in Jerome County	76.51	85.30	6.89	715.97	77.47	5.81	1.54
Percentage of Jerome County, emissions inventory total	1.21%	4.02%	40.15%	4.87%	3.63%	0.18%	0.21%
Portion of annual construction emissions in Lincoln County	40.72	45.40	3.67	381.08	41.23	3.09	0.82
Percentage of Lincoln County, emissions inventory total	0.75%	3.14%	8.85%	5.97%	3.69%	0.09%	0.07%
Portion of annual construction emissions in Minidoka County	6.17	6.88	0.56	57.74	6.25	0.47	0.12
Percentage of Minidoka County, emissions inventory total	0.07%	0.33%	1.38%	0.55%	0.32%	0.01%	0.01%

Overall, the pollutants emitted from project construction within Jerome County would be 4% or less of Jerome County's annual emission inventory with the exception of SO_X, which could be up to 40% of Jerome County's annual SO_X emissions. The biggest source of SO_X emissions during the construction of the project are the estimated 20 generators operating 10 hours per day, every day, for the duration of the 2-year construction. The pollutants emitted from project construction within Lincoln County would be 6% or less of Lincoln County's annual emission inventory, with the exception of SO_X, which could be up to 9% of Lincoln County's annual SO_X emissions. Finally, the pollutants emitted from project construction within Minidoka County would be 1% or less of Minidoka County's annual emission inventory. Project construction emissions would cease upon completion of construction activities and would not exceed federal or state ambient air quality standards.

Implementation of measures to reduce dust (applicant-committed measures 113 through 119) and require project personnel to drive 25 miles per hour (mph) or less and post speed limit signs (applicant-committed measure 33 and BLM-required measure N) would further minimize, but would not eliminate, the potential for PM_{10} and $PM_{2.5}$ emissions to be generated during construction.

Decommissioning emissions are estimated to be less than construction emissions because smaller rosters of vehicles and equipment would be needed, and concrete and blasting would not be needed.

A VISCREEN Level-1 screening analysis was performed for the construction emissions associated with the project to determine if project emissions during construction could cause visibility impairment. VISCREEN was applied with the guidance provided in the EPA's *Workbook for Plume Visual Impact Screening and Analysis (Revised)* (EPA 1992). A detailed summary of the analysis is available in the *Air Quality Technical Report for the Lava Ridge Wind Project* (SWCA 2022), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). The Level-1 screening results demonstrate that project construction would not cause a visible plume that would cause any visibility impairment inside Class I or Class II special consideration areas.

Pollutants generated by project construction were not modeled but were compared to existing emissions. Project construction emissions added to background concentrations would not violate the NAAQS, and the analysis area would remain in attainment for all criteria pollutants. Therefore, impacts to air quality from project construction would be minor but temporary.

In addition, a preliminary screening analysis using the EPA's AERSCREEN model (version 21112) was conducted to obtain conservative estimates of maximum predicted short-term and long-term concentrations of NO_2 and PM_{10} associated with the project. A pseudo point source was used to model the fugitive construction emissions at the closest distance to the boundary of the CRMO National Monument (Class I area) and to the boundary of the CRMO National Preserve (Class II special consideration area). The maximum modeled concentrations were then compared to each of the applicable standards, resulting in conservative concentration estimates. The evaluation of the project's impact at the nearest National Monument and Preserve boundary included evaluating particulate and oxides of nitrogen construction emissions from all the associated off-road vehicles and equipment tailpipe (for all phases), helicopters, blasting emissions, and fugitive dust from earthmoving from three wind turbine work areas. Up to three crews would be used to construct the project. Therefore, fugitive emissions from three approximately 6.5-acre wind turbine sites under simultaneous disturbance were included in the particulate emissions total. These emissions are fugitive in nature and would be spread over large areas. Thus, these sources would not cause the formation of coherent or co-located plumes, but the modeling analysis conservatively assumed a pseudo point source discharge. A detailed summary of the analysis is available in SWCA (2022). The modeling runs for NO_2 (1-hour and annual) and PM_{10} (24-hour) demonstrated to be below their respective NAAQS at the boundaries of the Class I area and the Class II special consideration area. Therefore, the predicted air quality impacts would not cause or contribute to a violation of any applicable NAAQS at the CRMO National Monument and Preserve.

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to air quality under Alternative B. Although these measures are not included as part of MVE's Proposed Action (Alternative B), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for construction air quality and air quality–related values are summarized in Table 3.2-7 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.2-7. Mitigation for Construction Air Quality and Air Quality–Related Values

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
33	N	a
113–119	–	c
–	–	e
–	–	f
–	–	g

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
–	–	h
–	–	i
–	–	j
–	–	k

Note: All measures are detailed in EIS Appendix 4.

With these additional measures in place, dust and other air pollutant emissions during construction and decommissioning would be further reduced. Furthermore, the construction emissions would be emitted over 3 years for Alternative B with Additional Measures, rather than the 2 years estimated for Alternative B.

3.2.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Impacts to air quality from construction of Alternative C would be the same as or slightly reduced from Alternative B with Additional Measures. Furthermore, the construction emissions would be emitted over 3 years for Alternative C, rather than the 2 years estimated for Alternative B. Alternative C would implement the same applicant-committed measures and would require the same additional mitigation measures as Alternative B with Additional Measures, which would similarly reduce dust and other air pollutant emissions during construction and decommissioning.

3.2.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Impacts to air quality from construction of Alternative D would be the same as or slightly reduced from Alternative C. Since Alternative D has the smallest acreage footprint, it is likely that Alternative D would see a larger reduction in construction emissions than Alternatives B, C, or E. Alternative D would implement the same applicant-committed measures and would require the same additional mitigation measures as Alternative B with Additional Measures, which would similarly reduce dust and other air pollutant emissions during construction and decommissioning.

3.2.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Impacts to air quality from construction of Alternative E would be the same as or slightly reduced from Alternative C. Alternative E would implement the same applicant-committed measures and would require the same additional mitigation measures as Alternative B with Additional Measures, which would similarly reduce dust and other air pollutant emissions during construction and decommissioning.

3.2.1.2.6 PREFERRED ALTERNATIVE

Impacts to air quality from construction of the Preferred Alternative would be the same as or slightly reduced from Alternative C. This means there would be fewer emissions generated by construction on an annual basis compared to the other alternatives. The Preferred Alternative would implement the same applicant-committed measures and would require the same additional mitigation measures as Alternative B with Additional Measures, which would similarly reduce dust and other air pollutant emissions during construction and decommissioning.

3.2.1.2.7 CUMULATIVE IMPACTS

Future trends and actions would also contribute to emissions. Cumulative air emissions in the region would increase during construction of the project and would increase by higher amounts and therefore have an increased temporary impact to local air quality if these projects (including the Lava Ridge Wind Project) are constructed at the same time. However, construction of all the future planned actions would likely occur at different times; therefore, their construction air emissions may not be cumulative. (The Taurus Wind Project may overlap 1 year with the Lava Ridge Wind Project.) Additionally, as described in Section 3.4.1.1.1 (Existing and Future Trends and Actions), based on general climate trends in Idaho, the frequency of wildfire occurrence and severity is projected to increase (Runkle et al. 2022) and would likely negatively impact local air quality.

3.2.1.3 Significance Determination

Under all action alternatives, potential adverse effects to air quality would not be significant. There would be short-term air pollutant emissions over the construction and decommissioning phases under all action alternatives, but these emissions would not exceed federal or state ambient air quality standards or cause any visibility impairment inside the Class I area or the Class II special consideration area.

3.2.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Project construction and decommissioning would not produce irreversible and irretrievable impacts to air quality. There would be short-term air pollutant emissions over the up-to-3-year construction and up-to-3-year decommissioning phases under all action alternatives except Alternative B (in which these emissions would occur over phases of up to 2 years), but these emissions would not exceed federal or state ambient air quality standards or cause any visibility impairment inside the Class I area or the Class II special consideration area.

3.2.2 Operation Air Quality and Air Quality–Related Values

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.2-8.

Table 3.2-8. Analysis Approach for Operation Air Quality and Air Quality–Related Values

Issue Analyzed in Detail	How would criteria pollutants, hazardous air pollutants (HAPs), and fugitive dust created during operation affect air quality, including air quality–related values (AQRVs) at Class I areas or non-attainment areas?
Analysis Area	The analysis area evaluated for this issue is the same as described in Section 3.2.1 (Construction Air Quality and Air Quality–Related Values).
Indicators	Emission estimates for regulated pollutants that exceed applicable regulations. Project emission estimates that exceed county emission inventories.
Impacts Duration	The 30-year operation and maintenance phase of the project.
Data Sources	The data sources evaluated for this issue are the same as those described in Section 3.2.1 (Construction Air Quality and Air Quality–Related Values).

Assumptions or Approach	Emissions estimates for the project were conducted using the following: • Off-road and on-road vehicle and equipment emissions were estimated using the latest version of the EPA's MOVES3 factors for Jerome County, Idaho, based on maximum summer or winter emission factors for calendar years 2023 and 2024 (EPA 2022d). • Emissions associated with on-road motor vehicles are primarily associated with utility trucks, cranes, and workers using the same construction travel trip assumptions. • Helicopter use during operation was based on 40 hours per year. • Leaks from sulfur hexafluoride (SF_6)–containing circuit breakers and switchers were estimated based on an assumed roster of equipment and a leak rate of 0.5% per year.

3.2.2.1 Affected Environment

The affected environment for operation is the same as the affected environment for construction. Please refer to Section 3.2.1.1 (Affected Environment).

3.2.2.2 Impacts

3.2.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and air quality would only be affected by existing and future trends and actions.

3.2.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Operation and maintenance activities from Alternative B would produce air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from the siting corridors for routine inspections, and fugitive dust from soil disturbance and travel on unpaved roads. Table 3.2-9 summarizes the estimated annual operation-related project emissions.

Table 3.2-9. Estimated Annual Project Operation and Maintenance Emissions (tons per year)

Category or Term	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	VOC	HAPs
Off-road construction equipment	0.32	0.72	0.07	0.03	0.03	0.03	0.01
On-road construction equipment, worker commuting, and material delivery	6.99	1.47	0.01	23.59	2.63	0.33	0.09
Helicopter	0.08	0.24	0.02	0.02	0.02	0.00	0.00
SF_6 leaks	–	–	–	–	–	–	–
Total	**7.40**	**2.43**	**0.09**	**23.63**	**2.67**	**0.36**	**0.09**
Portion of annual operation and maintenance emissions in Jerome County	4.59	1.51	0.06	14.65	1.66	0.22	0.06
Percentage of Jerome County, emissions inventory total	0.07%	0.07%	0.33%	0.10%	0.08%	0.01%	0.01%
Portion of annual operation and maintenance emissions in Lincoln County	2.44	0.80	0.03	7.80	0.88	0.12	0.03
Percentage of Lincoln County, emissions inventory total	0.05%	0.06%	0.07%	0.12%	0.08%	< 0.01%	< 0.01%

Category or Term	CO	NO_X	SO_X	PM_{10}	$PM_{2.5}$	VOC	HAPs
Portion of annual operation and maintenance emissions in Minidoka County	0.37	0.12	0.00	1.18	0.13	0.02	< 0.01
Percentage of Minidoka County, emissions inventory total	< 0.01%	0.01%	0.01%	0.01%	0.01%	< 0.01%	< 0.01%
Maximum annual avoided emissions	–	2,677.59	1,754.15	–	214.53	83.69	–
Minimum annual avoided emissions	–	1,511.06	990.53	–	122.28	47.96	–
Maximum 5-year avoided emissions	–	13,387.93	8,770.73	–	1,072.65	418.45	–
Minimum 5-year avoided emissions	–	7,555.30	4,952.65	–	611.40	239.80	–

Source: EPA (2022).

Emissions from vehicle travel and equipment exhaust during project operation would be minimal. Mileage for vehicle travel to and around the siting corridors for routine inspections would be much less than during construction. Potential SF_6 emissions from circuit breaker leaks would consist entirely of GHG emissions and are discussed in Section 3.4 (Climate and Greenhouse Gases).

Overall, the pollutants emitted from project operation within Jerome County would be 0.3% or less compared to Jerome County's annual emission inventory. The pollutants emitted from project operation within Lincoln County would be 0.1% or less compared to Lincoln County's annual emission inventory. The pollutants emitted from project operation within Minidoka County would be 0.01% or less compared to Minidoka County's annual emission inventory. MVE would implement all dust mitigation measures required by Idaho Administrative Code 58.01.01.650. Although project operation emissions were not modeled, they were compared to existing emissions. Project emissions, when added to background pollutant concentrations, are unlikely to violate the NAAQS and the project area would remain in attainment for all criteria pollutants. The impacts to air quality due to project operation would be minor. Furthermore, the project would generate energy from a renewable resource and would produce significantly fewer emissions than if the same amount of energy were generated by fossil fuels.

Future trends and actions would also contribute to emissions in addition to the Lava Ridge Wind Project. The project could also contribute to a long-term, cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source.

Alternative B with Additional Measures

Additional project-specific measures for operation air quality would be the same as those described above for construction air quality (see Table 3.2-7).

3.2.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Impacts to air quality due to project operation from Alternative C would likely be the same as Alternative B. Alternative C would require the same additional mitigation measures as Alternative B, which would similarly reduce dust and other air pollutant emissions during operation. There would be 5% to 26% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.2-10).

Table 3.2-10. Estimated Annual and 5-Year Avoided Emissions for Alternative C Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,786,980	1,969.92	1,290.91	158.68	62.13	37.72

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Minimum annual avoided emissions	2,027,610	1,426.97	935.43	115.52	45.36	27.75
Maximum 5-year avoided emissions	13,934,900	9,849.58	6,454.55	793.38	310.65	188.60
Minimum 5-year avoided emissions	10,138,050	7,134.85	4,677.13	577.60	226.78	138.73
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	26.1%	26.4%	26.4%	26.0%	25.8%	24.9%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	5.5%	5.6%	5.6%	5.5%	5.4%	5.4%

Source: EPA (2022).

3.2.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Impacts to air quality due to project operation from Alternative D would likely be slightly reduced compared to the impacts to air quality due to project operation from Alternative B because fewer vehicle trips would be required. Alternative D would require the same additional mitigation measures as Alternative B, which would similarly reduce dust and other air pollutant emissions during operation. There would be 30% to 50% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.2-11).

Table 3.2-11. Estimated Annual and 5-Year Avoided Emissions for Alternative D Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	1,920,120	1,350.92	885.62	109.39	42.99	26.31
Minimum annual avoided emissions	1,502,130	1,056.39	692.72	85.50	33.77	20.65
Maximum 5-year avoided emissions	9,600,600	6,754.58	4,428.08	546.93	214.95	131.53
Minimum 5-year avoided emissions	7,510,650	5,281.95	3,463.60	427.50	168.85	103.25
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	49.1%	49.5%	49.5%	49.0%	48.6%	47.6%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	30.0%	30.1%	30.1%	30.1%	29.6%	29.6%

Source: EPA (2022).

3.2.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Impacts to air quality due to project operation from Alternative E would likely be slightly reduced compared to the impacts to air quality due to project operation from Alternative B because fewer vehicle trips would be necessary during project operation. Alternative E would require the same additional mitigation measures as Alternative B, which would similarly reduce dust and other air pollutant emissions during operation. There would be 33% to 45% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.2-12).

Table 3.2-12. Estimated Annual and 5-Year Avoided Emissions for Alternative E Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,081,370	1,465.03	960.37	118.59	46.54	28.47

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Minimum annual avoided emissions	1,442,980	1,014.60	665.31	82.13	32.47	19.86
Maximum 5-year avoided emissions	10,406,850	7,325.15	4,801.83	592.95	232.70	142.33
Minimum 5-year avoided emissions	7,214,900	5,072.98	3,326.55	410.65	162.33	99.28
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	44.8%	45.3%	45.3%	44.7%	44.4%	43.3%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	32.8%	32.9%	32.8%	32.8%	32.3%	32.3%

Source: EPA (2022).

3.2.2.2.6 PREFERRED ALTERNATIVE

Impacts to air quality due to project operation from the Preferred Alternative would likely be slightly reduced compared to the impacts to air quality due to project operation from Alternative B because fewer vehicle trips would be necessary for project operation under the Preferred Alternative. The Preferred Alternative would require the same additional mitigation measures as Alternative B, which would similarly reduce dust and other air pollutant emissions during operation. There would be 39% to 43% fewer estimated avoided emissions if the capacity of the project is reduced compared to Alternative B (Table 3.2-13).

Table 3.2-13. Estimated Annual and 5-Year Avoided Emissions for the Preferred Alternative Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,155,090	1,517.47	994.73	122.79	48.16	29.44
Minimum annual avoided emissions	1,292,370	908.20	595.29	73.55	29.15	17.83
Maximum 5-year avoided emissions	10,775,450	7,587.35	4,973.65	613.95	240.80	147.18
Minimum 5-year avoided emissions	6,461,850	4,541.00	2,976.43	367.75	145.73	89.15
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	42.8%	43.3%	43.3%	42.8%	42.5%	41.4%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	39.8%	39.9%	39.9%	39.9%	39.2%	39.2%

Source: EPA (2022).

3.2.2.2.7 CUMULATIVE IMPACTS

Future trends and actions would also increase criteria pollutant emissions through operation of new energy generation facilities to meet future power demands. Since the future planned actions are also renewable energy projects, their operation emissions would be fewer than those generated by fossil fuels. Future trends and actions would also contribute to emissions. As described in Section 3.4.1.1.1 (Existing and Future Trends and Actions), based on general climate trends in Idaho, the frequency of wildfire occurrence and severity is projected to increase (Runkle et al. 2022). Cumulative air emissions in the region would increase minimally during operation of the project.

3.2.2.3 Significance Determination

Under all action alternatives, potential adverse effects to air quality would not be significant. There would be minor air pollutant emissions during the operation and maintenance phase of the project under all action alternatives, but these emissions would not exceed federal or state ambient air quality standards.

3.2.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Project operation would not produce irreversible and irretrievable impacts to air quality. There would be minor air pollutant emissions during the 30-year operation and maintenance phase of the project under all action alternatives, but these emissions would not exceed federal or state ambient air quality standards and would not impact the long-term productivity of the air quality resources.

3.3 AVIAN AND BAT SPECIES (SEE MAIN EIS)

3.4 CLIMATE AND GREENHOUSE GASES

3.4.1 Construction Greenhouse Gas Emissions

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.4-1.

Table 3.4-1. Analysis Approach for Construction Greenhouse Gas Emissions

Issue Analyzed in Detail	What quantity of GHG emissions would be emitted from construction and decommissioning of the project, and how do GHG emissions contribute to climate change?
Analysis Area	Because of the nature of GHGs, which become more spread out as they travel away from a source of pollution, the GHG analysis area is difficult to define. The analysis area for project GHG emissions extends approximately 31 miles (50 km) in all directions from the siting corridors (see Figure 3.2-1 in Section 3.2 [Air Quality]).
Indicators	Metric tons per year and total carbon dioxide equivalent (CO_2e) emissions on 20-year and 100-year global warming potential (GWP) basis. The CEQ released new interim guidance on January 9, 2023, regarding GHGs and climate change in the NEPA process (CEQ 2023). This interim guidance recommends that context for the GHG emissions and climate impacts associated with a project could be demonstrated by calculating the estimated social cost of greenhouse gases (SC-GHG). However, only direct project emissions were able to be quantified at this time. It is too speculative to estimate at this time the indirect impacts from the project, such as variations in power demand, quantity of renewable energy delivered to the power grid, and the offset of fossil-fuel-based power generation emissions from renewable energy delivery. Without the ability to calculate the benefits of GHG reductions achieved from renewable energy generation enabled by the project, an SC-GHG analysis based solely on emissions would skew and inaccurately represent the net carbon balance from the full life cycle of the project.
Impacts Duration	The up-to-3-year construction and decommissioning phases of the project.
Data Sources	The National Emissions Inventory is a detailed annual estimate of criteria pollutants, HAPs, and GHGs from air emission sources. Data are collected from state, local, and Tribal air agencies and supplemented with data from the EPA (EPA 2020a). The National Emissions Inventory includes estimates of emissions from many sources, including point sources, nonpoint sources, on-road sources, non-road sources, and event sources. When combined, the emission estimates from these sources create as complete an inventory as possible.
Assumptions or Approach	Emissions estimates for the project were conducted using the following: • Off-road and on-road vehicle and equipment emissions were estimated using the latest version of the EPA's MOVES3 factors for Jerome County, Idaho, based on maximum summer or winter emission factors for calendar years 2023 and 2024 (EPA 2022b). • Operating times for the equipment were based on a 7-day workweek and up to a 10-hour workday, depending on the type of equipment and activity, during which the equipment could be operating over the up-to-3-year construction phase. • Emissions associated with on-road motor vehicles used for security, escorting and project management, and personal employee vehicle trips were based on a travel distance of 65 miles originating from Twin Falls, Idaho. Delivery vehicle trips were based on a travel distance of 43 miles from the nearest rail station in Minidoka, Idaho. On-road truck trips, including concrete and water trucks, were assumed to travel 16 miles from the staging yards per day per truck. • Decommissioning emissions were estimated for both off-road and on-road vehicles and equipment using MOVES3 emission factors (EPA 2022b). Emissions are similar to that of construction, but with smaller rosters of vehicles and equipment and absent any need for concrete and blasting. • GWPs from IPCC's Fifth Assessment Report (AR5) (IPCC 2014) were used to calculate carbon dioxide (CO_2) equivalent (CO_2e) (as described in Section 3.4.1.1 [Affected Environment]). The emissions from wind turbine manufacturing and shipping to the United States are beyond the scope of the EIS and are not analyzed. Emissions are analyzed at the point of electricity generation rather than the entire lifecycle because lifecycle emissions of any form of power generation, including fossil-fuel- generated power, can vary greatly depending on project specifications. Location of and associated emissions from obtaining raw materials or turbine components varies, just like the location and emissions from obtaining raw materials or components necessary to create a natural gas well. Turbine or battery manufacturing location and their delivery route to the project area would be speculative as would the comparative distance and delivery route from wellhead/tank/separator manufacturers to natural gas well to storage battery to refinery to natural gas power plant. Therefore, entire lifecycle emission estimates that include manufacturing and shipping of wind turbines or a natural gas well, refinery, and power plant are highly speculative, with many variables and assumptions that render them incomparable as well as beyond the scope of this EIS.

3.4.1.1 Affected Environment

Climate change is a global process that is affected by the concentration of GHGs in the Earth's atmosphere, which is in turn, affected by total cumulative GHG emissions. The IPCC recently published its Sixth Assessment Report (AR6) (IPCC 2021). IPCC (2021) states that "it is unequivocal that human influence has warmed the atmosphere, ocean, and land" and that "widespread and rapid changes in the atmosphere, ocean, cryosphere, and biosphere have occurred" (IPCC 2021). Since the IPCC's previous iteration of IPCC (2014), concentrations of GHGs have continued increasing in the atmosphere.

The *greenhouse effect* refers to the process by which GHGs in the atmosphere absorb heat energy radiated by Earth's surface. Water vapor is the most abundant GHG, followed by CO_2, methane (CH_4), nitrous oxide (N_2O), and several other trace gases. Each of these GHGs exhibits a particular heat trapping effect, which causes additional heat retention in the atmosphere that would otherwise be radiated into space. The greenhouse effect is responsible for Earth's warm atmosphere and temperatures suitable for life on Earth. Different GHGs can have different effects on the Earth's warming due to their ability to absorb energy (their radiative efficiency) and how long they stay in the atmosphere (their lifetime). The GWP is a metric developed to allow comparisons of the global warming effects of different gases relative to CO_2 (expressed as CO_2 equivalent or CO_2e) (EPA 2020b) and is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years) compared with CO_2. CO_2 has a GWP of 1. The larger the GWP, the more warming the gas causes. For example, the 100-year GWP for CH_4 is estimated to be 28, meaning that CH_4 would cause 28 times as much warming as an equivalent mass of CO_2 over a 100-year time period (IPCC 2014). CO_2e is used to describe different GHGs in a common unit. For any quantity and type of GHG, CO_2e represents the amount of CO_2 that would have the equivalent global warming impact.

3.4.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions in the analysis area include population growth, which would increase overall mobile source GHG emissions. Several planned wind and solar energy development projects and transmission line projects are located in the analysis area. Notably, the Taurus Wind Project would be located immediately west of the siting corridors (potentially within 1 mile), and the Salmon Falls Wind Project would be approximately 30 miles south. The Taurus Wind Project would be of a similar size and scale (1,500 MW) to the Lava Ridge Wind Project and would likely have similar types and quantities of emissions. Salmon Falls Wind is a smaller project (800 MW) and would likely have similar types of emissions but fewer of them.

There is uncertainty related to future climate change trends in the analysis area because there is uncertainty related to future emission trends, ambient GHG concentrations, and the effect of increasing GHG concentrations on the Earth system. To further inform the analysis, regional climate change projections based on the most recent available data are included in this discussion of existing and future trends and planned actions. Global and regional climate predictions are based on various climate models that range from simple to complex, coupled with comprehensive Earth System Models. IPCC (2014) (the AR5) summarizes data from 30 different global climate models that evaluate the natural systems and feedback mechanisms contributing to climate variability. Scientists used these data and modeled GHGs in various scenarios to estimate future climate impacts based on a range of representative concentration pathways (RCPs) (IPCC 2014). The RCPs represent a range of mitigation scenarios modeled to assess levels of warming. RCP 4.5 represents a scenario in which medium-level mitigation is taken to constrain GHG emissions to attempt to reduce future warming. RCP 8.5 represents a scenario in which there is no additional effort to constrain GHG emissions. The scenarios are considered to be illustrative and do not have probabilities assigned to them (IPCC 2014).

Figure 3.4-1 illustrates the predicted future (2075–2099) mean temperatures for Idaho under these two mitigation effort pathways (RCP 4.5 and RCP 8.5) and how they compare to the historical mean temperatures for the state from 1981 to 2010 (Alder and Hostetler 2013).

Regardless of the degree of climate change impacts, some general trends in Idaho are projected:

- The potential for more frequent and extreme droughts in the future and predicted snow-pack accumulation decrease would pose a major challenge to environmental, agricultural, and human systems (Runkle et al. 2022).
- The frequency of wildfire occurrence and severity is projected to increase (Runkle et al. 2022).
- The annual average temperature, which has increased about 2 degrees Fahrenheit (1.1 degrees Celsius) since the early twentieth century, is projected to continue to increase in the future along with incidences of extreme heat events (Runkle et al. 2022).

The *Climate Change 2023: Synthesis Report* (IPCC 2023) of IPCC (2021) states that the amount of current global climate adaptation measures, like the development of renewable energy, is inadequate to prevent widespread adverse impacts and related losses and damages to nature and people. IPCC (2023) states with high confidence that for any given future warming level, many climate-related risks are higher than assessed in IPCC (2014), and projected long-term impacts are up to multiple times higher than currently observed. IPCC (2023) also states with high confidence that energy generation diversification (e.g., wind) can increase energy reliability and reduce vulnerabilities to climate change.

To mitigate damaging impacts from climate change, deep reductions in CO_2 and other GHG emissions need to occur over the coming decades (IPCC 2021). The importance of limiting warming to less than 1.5°C is detailed in *Special Report: Global Warming of 1.5°C* (IPCC 2018a). For context, climate modeling predicts (with medium confidence) that limiting global warming to 1.5°C compared to 2°C may reduce the proportion of the world population exposed to a climate change–induced increase in water stress by up to 50%, although there is considerable variability between regions (IPCC 2018a). Further benefits of limiting warming to 1.5°C versus 2°C are available in IPCC (2018a). Without deep reductions in GHG emissions, global warming of 1.5°C and 2°C are predicted to be exceeded during the twenty-first century (IPCC 2021).

The most recently available data on GHG emissions in the United States indicate that annual GHG emissions in 2019 were approximately 6,558 million metric tons of GHG, or 5,769 million metric tons of CO_2e after accounting for sequestration from the land sector (EPA 2021). The most recent National Emissions Inventory data, summarized in Table 3.4-2, indicate that there were approximately 37.1 million metric tons of GHG emissions in the state of Idaho and approximately 1.1 million metric tons of GHG emissions between Jerome, Lincoln, and Minidoka Counties in 2017 (EPA 2020a).

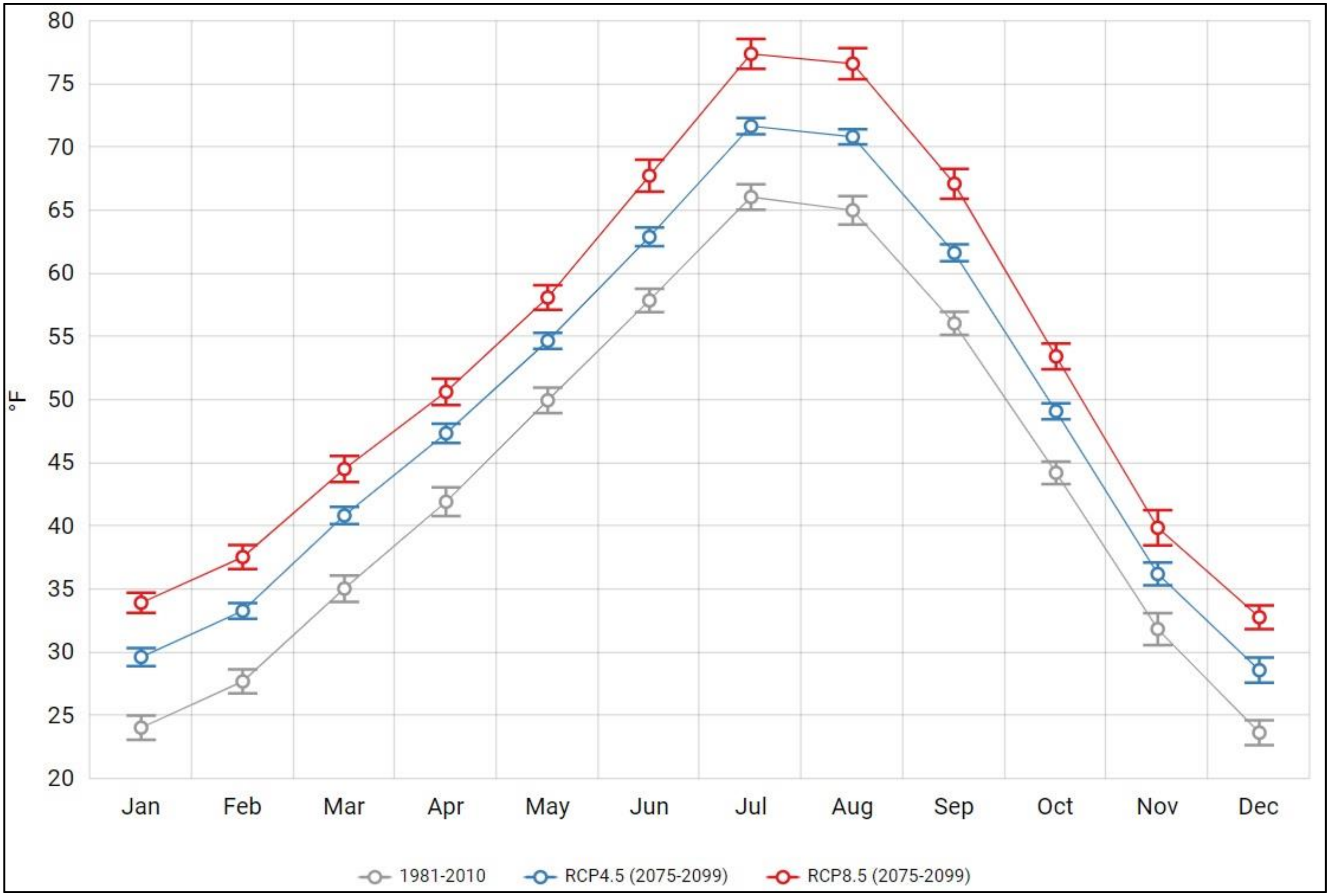

Figure 3.4-1. Historical (1981–2010) and projected (2075–2099) mean surface temperatures in Idaho.

Table 3.4-2. 2017 National Emission Inventory for Jerome, Lincoln, and Minidoka Counties, Idaho

Jerome County Sector	CO_2 (tons per year)	CH_4 (tons per year)	N_2O (tons per year)	CO_2e* (metric tons per year)
Agriculture	0.00	0.00	0.00	0.00
Biogenics†	0.00	0.00	0.00	0.00
Dust	0.00	0.00	0.00	0.00
Fires	9,761.51	24.80	0.00	9,417.91
Fuel combustion	0.00	0.00	0.00	0.00
Industrial processes	0.00	0.00	0.00	0.00
Miscellaneous‡	0.00	0.00	0.00	0.00
Mobile	477,611.27	30.56	7.26	435,936.92
Waste disposal	0.00	0.00	0.00	0.00
Total	**487,372.78**	**55.36**	**7.26**	**445,354.82**
Lincoln County Sector	**CO_2 (tons per year)**	**CH_4 (tons per year)**	**N_2O (tons per year)**	**CO_2e* (metric tons per year)**
Agriculture	0.00	0.00	0.00	0.00
Biogenics†	0.00	0.00	0.00	0.00
Dust	0.00	0.00	0.00	0.00
Fires	65,296.59	170.08	0.00	63,093.51
Fuel combustion	0.00	0.00	0.00	0.00
Industrial processes	0.00	0.00	0.00	0.00
Miscellaneous‡	0.00	0.00	0.00	0.00
Mobile	86,100.97	4.93	1.90	78,735.86
Waste disposal	0.00	0.00	0.00	0.00
Total	**151,397.56**	**175.02**	**1.90**	**141,829.36**
Minidoka County Sector	**CO_2 (tons per year)**	**CH_4 (tons per year)**	**N_2O (tons per year)**	**CO_2e* (metric tons per year)**
Agriculture	0.00	0.00	0.00	0.00
Biogenics†	0.00	0.00	0.00	0.00
Dust	0.00	0.00	0.00	0.00
Fires	33,022.03	120.42	0.00	32,688.24
Fuel combustion	0.00	0.00	0.00	0.00
Industrial processes	287,484.60	484.59	0.78	272,002.36
Miscellaneous‡	0.00	0.00	0.00	0.00
Mobile	242,035.42	18.21	6.20	221,659.38
Waste disposal	0.00	0.00	0.00	0.00
Total	**562,542.05**	**623.22**	**6.98**	**526,349.98**

Source: EPA (2020a).

* CO_2e (CO_2 equivalent) assumes an EPA recommended GWP of 25 for CH_4 and 298 for N_20 and is metric tons per year.

† Biogenic emissions are those emissions derived from natural processes (such as vegetation and soil).

‡ Miscellaneous categories include bulk gasoline terminals, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.

Mobile sources are the largest contributors to GHG emissions in Jerome and Lincoln Counties, consisting of 98% and 56% of the county's emission inventory, respectively. Industrial processes are the largest contributor to GHG emissions in Minidoka County, consisting of 52% of the county's emission inventory.

3.4.1.2 Impacts

3.4.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and climate and GHG emissions would only be affected by existing and future trends and actions.

3.4.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Impacts of the Project on Climate Change

Construction activities for Alternative B would result in air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from the siting corridors, delivery truck exhaust, and fugitive dust from soil disturbance and travel on unpaved roads. Table 3.4-3 summarizes the estimated annual construction-related project GHG emissions. These emission estimates represent Alternative B's projected direct and reasonably foreseeable indirect GHG emissions.

Table 3.4-3. Estimated Annual Project Construction Greenhouse Gas Emissions

Emission Source	100-year CO_2e Emissions (metric tons per year)	20-year CO_2e Emissions (metric tons per year)
Off-road construction equipment (includes diesel-fueled generators)	30,646	30,666
On-road construction equipment, worker commuting, concrete and material delivery	18,418	18,436
Helicopter	295	295
Total	**49,359**	**49,397**

Notes: CO_2e is a measure of the total energy that a gas absorbs over a particular period of time (in this case, 100 years and 20 years are presented) compared with CO_2.

Calculations are provided for Alternative B. Other action alternatives would be slightly less though roughly similar because the magnitude of direct construction emissions is low (< 0.01% of avoided operational emissions) and the differences in number of turbines per alternative would not substantially change the amount of generated GHG emissions during construction. All action alternatives are expected to have an up-to-3-year construction phase.

Implementation of MVE's applicant-committed measures to encourage carpooling among construction workers (measure 39) and minimize excessive exhaust emissions (measure 118) would help reduce construction GHG emissions generated by construction equipment and worker commuting (see Table App4-2 in EIS Appendix 4).

Decommissioning emissions are estimated to be less than construction emissions because smaller rosters of vehicles and equipment are needed. There would be a minor increase in GHG emissions due to project construction in Jerome, Lincoln, and Minidoka Counties. Project construction would contribute incrementally to global climate change but would not produce emission volumes large enough to significantly impact climate change or climate trends at the global, national, state, or local scales.

Impacts of Climate Change on the Project

All phases of the project could be impacted by climate change due to extreme weather events, such as drought, storms, or wildfires, that could lead to schedule disruptions, the need for more durable construction materials, potential storm damage to turbines or other infrastructure, and potential increased frequency of maintenance activities. The project was designed to apply fire prevention measures and precautions. As described in applicant-committed measure 49, a fire protection and prevention plan would be implemented and would outline responsibilities, notification procedures, fire prevention measures and precautions, fire suppression equipment, initial response procedures, and post-fire rehabilitation strategies related to the project.

Alternative B with Additional Measures

No additional project-specific measures related to construction GHG emissions would be implemented for Alternative B.

3.4.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Impacts on GHG emissions and climate change due to Alternative C would be the same as or slightly fewer than Alternative B because of the smaller footprint and fewer turbines installed. Alternative C would include the same applicant-committed measures as Alternative B, which would similarly reduce construction GHG emissions generated by construction equipment and worker commuting.

3.4.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would have the same types of GHG emissions and effects as Alternative B; however, because Alternative D would have the fewest number of turbines, it would likely generate the least amount of GHGs during installation. Alternative D would have the least amount of ground disturbance of the action alternatives. Alternative D would include the same applicant-committed measures as Alternative B, which would similarly reduce construction GHG emissions generated by construction equipment and worker commuting.

3.4.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Impacts on GHG emissions and climate change due to Alternative E would be the same as or slightly reduced from Alternative B because of the smaller footprint and fewer turbines installed. Alternative E would include the same applicant-committed measures as Alternative B, which would similarly reduce construction GHG emissions generated by construction equipment and worker commuting.

3.4.1.2.6 PREFERRED ALTERNATIVE

Impacts on GHG emissions and climate change due to the Preferred Alternative would be the same as or slightly reduced from Alternative B because of the smaller footprint and fewer turbines installed. The Preferred Alternative would include the same applicant-committed measures as Alternative B, which would similarly reduce construction GHG emissions generated by construction equipment and worker commuting.

3.4.1.2.7 CUMULATIVE IMPACTS

Future trends and actions would contribute to local GHG emissions. Although cumulative GHG emissions in the region would increase during construction, the project could also contribute to a long-term, cumulative net decrease in emissions by substituting some existing fossil fuel sources with a renewable source.

3.4.1.3 Significance Determination

Under all action alternatives, potential adverse effects to climate change and greenhouse gases would not be significant. Although there would be minor, short-term GHG emissions under all action alternatives over the construction and decommissioning phases, the project would not produce emission volumes large enough to significantly impact climate change or climate trends at global, national, state, or local scales.

3.4.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The latest IPCC report indicates human activity is changing the climate in inevitable and irreversible ways. In the next two decades, temperatures are likely to rise by more than 1.5°C above pre-industrial levels (IPCC 2023). Although there would be minor, short-term, irreversible GHG emissions under all action alternatives over the up-to-3-year construction and up-to-3-year decommissioning phases, the project would not produce emission volumes large enough to significantly impact climate change or climate trends at global, national, state, or local scales. Furthermore, the use of wind to generate electricity reduces the long-term need to generate electricity from traditional fossil fuel–powered plants that produce GHG emissions.

3.4.2 Operation Greenhouse Gas Emissions

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.4-4.

Table 3.4-4. Analysis Approach for Operation Greenhouse Gas Emissions

Issue Analyzed in Detail	What quantity of GHG emissions would be emitted from operation of the project, and how do GHG emissions contribute to climate change?
Analysis Area	The analysis area evaluated for this issue is the same as described in Section 3.4.1 (Construction Greenhouse Gas Emissions).
Indicators	Metric tons per year and total CO2e emissions on 20-year and 100-year GWP basis.
Impacts Duration	The 30-year operation and maintenance phase of the project.
Data Sources	The data sources evaluated for this issue are the same as those described in Section 3.4.1 (Construction Greenhouse Gas Emissions).
Assumptions or Approach	Emissions estimates for the project were conducted using the following: • Off-road and on-road vehicle and equipment emissions were estimated using the latest version of the EPA's MOVES3 factors for Jerome County, Idaho, based on maximum summer or winter emission factors for calendar years 2023 and 2024 (EPA 2022b). • Emissions associated with on-road motor vehicles are primarily associated with utility trucks, cranes, and workers using the same construction travel trip assumptions. • Helicopter use during operation was based on 40 hours per year. • Leaks for SF_6-containing circuit breakers and switchers were estimated based on an assumed roster of equipment and 0.5% per year leak rate. • GWPs from IPCC (2014) were used to calculate CO_2e.

3.4.2.1 Affected Environment

The affected environment for operation GHG emissions is the same as the affected environment for construction GHG emissions.

3.4.2.2 Impacts

3.4.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and climate and GHG emissions would only be affected by existing and future trends and actions. This alternative would result in no emissions generated by the project, but would also offer no avoided emissions, resulting in higher GHG emissions over the life of the project by not displacing traditional power generation with a renewable energy source.

3.4.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Operation and maintenance activities for Alternative B would result in air pollutant emissions from equipment exhaust, vehicle exhaust from travel to and from the siting corridors for routine inspections, helicopter use, and SF_6 leaks. Table 3.4-5 summarizes the estimated annual operation-related project GHG emissions.

Table 3.4-5. Estimated Annual Project Operation and Maintenance Greenhouse Gas Emissions

Emission Source	100-year CO_2e Emissions (metric tons per year)	20-year CO_2e Emissions (metric tons per year)
Off-road equipment	210	210
On-road equipment, worker commuting, and material delivery	979	981
Helicopter	5	5
SF_6 leaks	177	177
Total	**1,372**	**1,374**

Note: Calculations are provided for Alternative B. Other action alternatives would be slightly less though roughly similar because the magnitude of direct operational emissions is so low (< 3% of construction emissions and < 0.01% of avoided operational emissions), and small differences in MW capacity would not substantially change the amount of generated GHG emissions during operation.

GHG emissions for project operation and maintenance would be much less than those for construction. Emissions from leaks for SF_6-containing circuit breakers and switchers were estimated based on an assumed roster of equipment and a 0.5% per year leak rate. Project operation and maintenance emissions would contribute incrementally to global climate change but would not produce emission volumes large enough to significantly impact climate change or climate trends at the global, national, state, or local scales.

Avoided Emissions

The use of wind to generate electricity reduces the need to generate electricity from traditional fossil fuel–powered plants that produce GHG emissions. The estimated avoided emissions by generating electricity via the project instead of traditional fossil fuel–powered plants were calculated using the EPA’s AVERT Excel Edition, Version 3.2 for the Northwest region based on EPA’s 2019 regional data file. Regional data for 2020 and 2021 are available; however, because of temporary declines in electricity demands, particularly from March through May 2020 (likely caused by the pandemic), the EPA recommends using the 2019 regional data file when assessing annual, near-term future avoided emissions. The EPA's AVERT is not a long-term projection tool and is not intended to analyze avoided emissions for more than 5 years from baseline. The estimated annual and 5-year long-term total avoided emissions are based on minimum and maximum design capacity of the project (1,200 MW and 2,094 MW, respectively). To provide a rough estimate of the long-term avoided emissions of the project, the maximum and minimum annual avoided emissions estimated by AVERT were multiplied by 5 years. As presented in Table 3.4-6, the project would annually displace CO_2, NO_X, SO_2, $PM_{2.5}$, VOC, and ammonia (NH_3) produced by the Idaho electric grid and decrease the creation of air pollutant emissions in the atmosphere from traditional fossil fuel–fired power plants. The minimum amount of CO_2 emissions that the project would avoid annually is equivalent to 433,244 gasoline-powered passenger vehicles removed from the road for 1 year. The maximum amount of CO_2 emissions that the project would avoid annually is equivalent to 760,861 gasoline-powered passenger vehicles removed from the road for 1 year (EPA 2023).

Table 3.4-6. Estimated Annual and 5-Year Avoided Emissions for Alternative B Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	3,768,950	2,677.59	1,754.15	214.53	83.69	50.23
Minimum annual avoided emissions	2,146,090	1,511.06	990.53	122.28	47.96	29.32
Maximum 5-year avoided emissions	18,844,750	13,387.93	8,770.73	1,072.65	418.45	251.13
Minimum 5-year avoided emissions	10,730,450	7,555.30	4,952.65	611.40	239.80	146.60

Source: EPA (2022).

Social Cost of Carbon

The Social Cost of Carbon, now referred to as SC-GHG, attempts to quantify the monetary value of net damages from climate change. The SC-GHG is the estimated cost resulting from the addition of GHG emissions to the atmosphere. SC-GHG values for use in analysis are derived on a per-metric-ton basis for CO_2, CH_4, and N_2O for each emission year from 2020 to 2050. Higher GWP GHGs such as CH_4 and N_2O have a higher SC-GHG on a per-metric-ton basis than CO_2. The intention in the analysis is to include the value of all climate change impacts, including (but not limited to) changes in net agricultural productivity, human health effects, property damage from increased flood risk natural disasters, disruption of energy systems, risk of conflict, environmental migration, and the value of ecosystem services (Interagency Working Group on Social Cost of Greenhouse Gases [IWG] 2021). EO 12866 (Regulatory Planning and Review) directs agencies to "base decisions on the best reasonably obtainable scientific, technical, economic, and other information." EO 13990 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis) reinstates the IWG and directs them to publish an interim update to the SC-GHG, which includes a method to estimate the social cost of CO_2, CH_4, and N_2O. The interim SC-GHG estimates presented in the *Technical Support Document: Social Cost of Carbon, Methane, Nitrous Oxides* were published on February 26, 2021, and are used as the basis for this analysis (IWG 2021).

The interim SC-GHG estimates from IWG (2021) described above are used to contextualize GHG impacts in terms of economic damages. The cost attributable to 1 metric ton of each GHG emitted is estimated based on the year emitted and the estimated global economic damages discounted to their present value using the appropriate discount rate.

The total estimated present value of future costs incurred from climate change as a result of the project are presented in Table 3.4-7 using each of the four sets of SC-GHG values recommended in IWG (2021). The estimated costs in Table 3.4-7 were calculated for Alternative B based on the calculated emission estimates (previously presented in Tables 3.4-3 and 3.4-5).

Table 3.4-7. Social Cost of Greenhouse Gases from Alternative B (2020 dollars)

Phase	5% Discount Rate - Average	3% Discount Rate - Average	2.5% Discount Rate - Average	3% Discount Rate - 95th percentile
Construction (total)	$1,569,361	$5,356,403	$7,930,803	$15,981,084
Operation (annually)	$18,393	$63,666	$94,496	$190,691
Decommissioning/reclamation (total)	$532,530	$2,547,221	$4,054,925	$7,785,224

AVERT was used to estimate the annual avoided emissions based on minimum and maximum design capacity of each alternative. The amount of CO_2 emissions that would be avoided annually as estimated by AVERT was then used to estimate the SC-GHG that would be avoided annually using each of the four sets of SC-GHG values recommended in IWG (2021) with the operation of Alternatives B–E and the Preferred Alternative. The minimum and maximum annual avoided SC-GHG for each alternative are provided in Table 3.4-8.

Table 3.4-8. Annual Avoided Social Costs of Greenhouse Gases based on Annual Avoided Emissions

Term	5% Discount Rate - Average	3% Discount Rate - Average	2.5% Discount Rate - Average	3% Discount Rate - 95th percentile
Alternative B maximum generation*	$52,469,864	$181,842,573	$269,952,739	$545,176,428
Alternative B minimum generation†	$29,877,035	$103,543,567	$153,714,662	$310,430,672
Alternative C maximum generation‡	$38,799,460	$134,465,637	$199,619,739	$403,137,145
Alternative C minimum generation§	$28,227,749	$97,827,709	$145,229,237	$293,294,141
Alternative D maximum generation¶	$26,731,307	$92,641,554	$137,530,177	$277,745,694
Alternative D minimum generation#	$20,912,182	$72,474,459	$107,591,299	$217,283,367
Alternative E maximum generation**	$28,976,179	$100,421,511	$149,079,841	$301,070,535
Alternative E minimum generation††	$20,088,714	$69,620,602	$103,354,632	$208,727,309
Preferred Alternative maximum generation‡‡	$30,002,486	$103,978,338	$154,360,097	$311,734,146
Preferred Alternative minimum generation§§	$17,991,969	$62,354,001	$92,567,066	$186,941,547

* Maximum generation for Alternative B is based on 349 6-MW turbines.
† Minimum generation for Alternative B is based on 400 3-MW turbines.
‡ Maximum generation for Alternative C is based on 259 6-MW turbines.
§ Minimum generation for Alternative C is based on 378 3-MW turbines.
¶ Maximum generation for Alternative D is based on 178 6-MW turbines.
\# Minimum generation for Alternative D is based on 280 3-MW turbines.

** Maximum generation for Alternative E is based on 194 6-MW turbines.

†† Minimum generation for Alternative E is based on 269 3-MW turbines.

‡‡ Maximum generation for the Preferred Alternative is based on 241 5-MW turbines .

§§ Minimum generation for the Preferred Alternative is based on 241 3-MW turbines.

Significant uncertainty in the SC-GHG estimates exist. Uncertainty is addressed in part through a combination of multi-model ensemble, probabilistic analysis, and scenario analysis. However, it is important to disclose that uncertainty is substantial (IWG 2021). These uncertainties do not all work in the same direction in terms of their influence on the SC-GHG estimates. However, it is the IWG's judgment that, taken together, the limitations suggest that the interim SC-GHG estimates presented in IWG (2021) likely underestimate the damages from GHG emissions (IWG 2021). Uncertainties in the SC-GHG estimates stem from inherent uncertainties about what will happen in the future as well as known limitations in the models used to develop the SC-GHG estimates in IWG (2021). The SC-GHG and AVERT modeling do not consider potential effects of substitution across energy markets but rather reflect energy equivalency. AVERT is a model with limitations that does not account for all factors.

Alternative B with Additional Measures

No additional project-specific measures related to operation GHG emissions would be implemented for Alternative B.

3.4.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

There could be slightly fewer GHG emissions produced by Alternative C compared to Alternative B because of Alternative C's smaller footprint and fewer turbines, though operation emissions would be very low and roughly similar for all action alternatives (see Table 3.4-5). However, there would be 5% to 26% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.4-9).

Table 3.4-9. Estimated Annual and 5-Year Avoided Emissions for Alternative C Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,786,980	1,969.92	1,290.91	158.68	62.13	37.72
Minimum annual avoided emissions	2,027,610	1,426.97	935.43	115.52	45.36	27.75
Maximum 5-year avoided emissions	13,934,900	9,849.58	6,454.55	793.38	310.65	188.60
Minimum 5-year avoided emissions	10,138,050	7,134.85	4,677.13	577.60	226.78	138.73
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	26.1%	26.4%	26.4%	26.0%	25.8%	24.9%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	5.5%	5.6%	5.6%	5.5%	5.4%	5.4%

Source: EPA (2022a).

3.4.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

There could be fewer GHG emissions produced by Alternative D compared to Alternative B and C because Alternative D would have the smallest footprint and fewer turbines and would also require fewer vehicle trips, though operation emissions would be very low and roughly similar for all action alternatives (see Table 3.4-5). However, there would be 30% to 50% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.4-10).

Table 3.4-10. Estimated Annual and 5-Year Avoided Emissions for Alternative D Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	1,920,120	1,350.92	885.62	109.39	42.99	26.31
Minimum annual avoided emissions	1,502,130	1,056.39	692.72	85.50	33.77	20.65
Maximum 5-year avoided emissions	9,600,600	6,754.58	4,428.08	546.93	214.95	131.53
Minimum 5-year avoided emissions	7,510,650	5,281.95	3,463.60	427.50	168.85	103.25
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	49.1%	49.5%	49.5%	49.0%	48.6%	47.6%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	30.0%	30.1%	30.1%	30.1%	29.6%	29.6%

Source: EPA (2022a).

3.4.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Similar to Alternative D, there could be fewer GHG emissions produced by Alternative E compared to Alternatives B and C because of Alternative E's smaller footprint and fewer turbines and fewer vehicle trips, though operation emissions would be very low and roughly similar for all action alternatives (see Table 3.4-5). However, there would be 32% to 45% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.4-11).

Table 3.4-11. Estimated Annual and 5-Year Avoided Emissions for Alternative E Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,081,370	1,465.03	960.37	118.59	46.54	28.47
Minimum annual avoided emissions	1,442,980	1,014.60	665.31	82.13	32.47	19.86
Maximum 5-year avoided emissions	10,406,85 0	7,325.15	4,801.83	592.95	232.70	142.33
Minimum 5-year avoided emissions	7,214,900	5,072.98	3,326.55	410.65	162.33	99.28
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	44.8%	45.3%	45.3%	44.7%	44.4%	43.3%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	32.8%	32.9%	32.8%	32.8%	32.3%	32.3%

Source: EPA (2022a).

3.4.2.2.6 PREFERRED ALTERNATIVE

Similar to Alternatives D and E, there could be fewer GHG emissions produced by the Preferred Alternative compared to Alternatives B and C because of the Preferred Alternative's smaller footprint, fewer turbines, and reduced number of vehicle trips, though operation emissions would be very low and roughly similar for all action alternatives (see Table 3.4-5). However, there would be 39% to 43% fewer estimated avoided emissions if the capacity of the project is reduced (Table 3.4-12).

Table 3.4-12. Estimated Annual and 5-Year Avoided Emissions for the Preferred Alternative Operation (tons)

Term	CO_2	NO_X	SO_2	$PM_{2.5}$	VOC	NH_3
Maximum annual avoided emissions	2,155,090	1,517.47	994.73	122.79	48.16	29.44
Minimum annual avoided emissions	1,292,370	908.20	595.29	73.55	29.15	17.83
Maximum 5-year avoided emissions	10,775,450	7,587.35	4,973.65	613.95	240.80	147.18
Minimum 5-year avoided emissions	6,461,850	4,541.00	2,976.43	367.75	145.73	89.15
Percent reduced annual avoided emissions compared to Alternative B maximum annual avoided emissions	42.8%	43.3%	43.3%	42.8%	42.5%	41.4%
Percent reduced annual avoided emissions compared to Alternative B minimum annual avoided emissions	39.8%	39.9%	39.9%	39.9%	39.2%	39.2%

Source: EPA (2022a).

3.4.2.2.7 CUMULATIVE IMPACTS

Future trends and actions would also increase GHG emissions through operation of new energy generation facilities to meet future power demands. Since the future planned actions are also renewable energy projects, their operation emissions would be fewer than those generated by fossil fuels (see section below for more details).

One proposed project, Taurus Wind, would be immediately west of the Lava Ridge Wind Project and would be of a similar size and scale (1,500 MW). Another proposed wind project, Salmon Falls Wind (800 MW), would be approximately 30 miles south of the Lava Ridge Wind Project. Three solar facilities are also proposed adjacent to the siting corridors. The Invenergy Gem Vale facility would cover approximately 3,500 acres on the east side of U.S. 93, just north of the Midpoint Substation. Two Longroad Energy facilities would producing roughly a combined 1,000 MW just east of U.S. 93 and south of (connecting to) the Midpoint Substation.

The project would incrementally contribute toward achievement of national climate change goals. Without deep reductions in GHG emissions globally, a warming of 2°C is predicted to be exceeded during the twenty-first century, which is projected to increase climate change risk and have adverse consequences for human and ecological systems (IPCC 2021). The impacts to climate change from project operation would be minor. As described below, the project would generate energy from a renewable resource and would result in significantly fewer emissions than if the same amount of energy were generated by fossil fuels.

3.4.2.3 Significance Determination

Under all action alternatives, potential adverse effects to climate change and GHGs would not be significant. Although there would be minor GHG emissions under all action alternatives over the 30-year operation and maintenance phase, the project would not produce emission volumes large enough to significantly impact climate change or climate trends at global, national, state, or local scales. Estimated avoided GHG emissions under all action alternatives (see Tables 3.4-6, 3.4-9, 3.4-10, 3.4-11, and 3.4-12) would have a net beneficial effect on climate change.

3.4.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The latest IPCC report indicates human activity is changing the climate in inevitable and irreversible ways. Although there would be minor, irreversible GHG emissions under all action alternatives during the 30-year operation and maintenance phase, the project would not produce emission volumes large enough to significantly impact climate change or climate trends at global, national, state, or local scales. Furthermore, the use of wind to generate electricity could avert long-term GHG emissions that would be generated if the electricity were generated from traditional fossil fuel–powered plants. The estimated avoided emissions by generating electricity via the project instead of traditional fossil fuel–powered plants is presented in Tables 3.4-6, 3.4-9, 3.4-10, 3.4-11, and 3.4-12. Estimated avoided GHG emissions under all action alternatives would have a net long-term beneficial effect.

3.5 CULTURAL RESOURCES (SEE MAIN EIS)

3.6 ENVIRONMENTAL JUSTICE AND SOCIOECONOMICS

3.6.1 Environmental Justice Communities (see main EIS)

3.6.2 Community Services, Employment, and Housing Availability

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.6-1.

Table 3.6-1. Analysis Approach for Community Services, Employment, and Housing Availability

Issue Analyzed in Detail	How would project construction and operation affect community services, employment, and housing availability?
Associated Issues Analyzed in Brief	AIB-11: How would the project impact emergency responders that serve the project vicinity? AIB-17: Would construction of the project limit or restrict access to locatable minerals in and around the project? AIB-18: Would the project limit or restrict access to saleable minerals (materials such as gravel and rock quarries, for example) available from BLM public lands in and around the project? AIB-19: Would construction of the project limit or restrict access to leasable minerals in and around the project? AIB-29: How would the project contribute to changes or degradations to resources that would affect hunting spending? AIB-45: How would hazardous materials and wastes generated by the project be managed? Would they exceed capacities of approved disposal facilities? AIB-46: How would solid wastes generated by the project (packaging materials and employee-generated wastes) be managed? Would they exceed capacities of approved disposal facilities?
Analysis Area	The tri-county area (Lincoln, Jerome, and Minidoka Counties) where local communities and economies could be affected by the project. Additionally, the towns of Twin Falls and Burley, which are just outside the tri-county analysis area but are within approximately 10 miles of the project, may also be affected by project-related effects on community services, employment, and housing; therefore, these two communities are included in the analysis area and have been considered in the impacts analysis wherever appropriate.
Indicators	Increase (count and percentage change) in employment during construction and operation. Increase (count and percentage change) to population and associated demands on community services during construction and operation. Change in the housing availability during construction and operation. Increase in annual tax revenues for local tax districts (e.g., school, fire, highway) during operation. Increased mileage of new roads open to the public during construction and operation.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Described in section text.
Assumptions or Approach	Analytical assumptions to clarify best-available data sources or modeling limitations for the socioeconomics analysis are as follows: • The population demographics remain consistent with predicted patterns and trends. • The impacts of decommissioning would be the same in scope as those described for construction. • The entire workforce needed for project construction and operation would be non-local workers (i.e., from outside the tri-county area). Although MVE would hire as many local workers as possible, the number or percentage of local hires is unknown, and assuming all workers would be non-local provides a conservative basis for impact analysis. • Assumptions and findings made in *the Economic and Fiscal Impacts Report: Two Proposed Southern Idaho Windfarms and the SWIP-North Transmission Line in Southern Idaho and Eastern Nevada* (Black and Peterson 2020) are based on established models and best available data and are therefore reasonable and apply to this impact analysis.

3.6.2.1 Affected Environment

Employment, population, and housing characteristics of the analysis area, based on American Community Survey 5-year data from 2017 to 2021 are presented below (U.S. Census Bureau 2022) (Table 3.6-2). The state of Idaho's population is projected to grow at an annual rate of 1.1% through 2029, for a statewide total of 1,990,232 in 2029 (Idaho Department of Labor 2020). For the south-central portion of Idaho (where the three counties in the analysis area are located), the population is projected to grow at an annual rate of 1.0% through 2029 (Idaho Department of Labor 2020).

Based on the most recent forecast data, the changes in nonfarm jobs in the state of Idaho are predicted to increase by approximately 2% to 3% each year between 2023 and 2028 (Idaho Division of Financial Management 2023). Trends are forecast for the entire state of Idaho; trends in the tri-county analysis area are assumed to mirror statewide trends.

Based on a review of census data, there are approximately 113,155 housing units in the analysis area, with an average vacancy rate of approximately 6.2%. The percentage of renter-occupied units where rent is greater than 30% of household income (i.e., where housing generally becomes unaffordable) ranges from 36% to 46% for the analysis area (see Table 3.6-2). The state of Idaho housing starts forecasts range from 21,676 units in 2023 to 25,593 units in 2026. These forecasts reflect a gradual and continued increase in demand for housing largely due to over 30,000 new residents moving into the state each year (Idaho Division of Financial Management 2023).

Local tax districts within the analysis area comprise county governments and local school, college, fire, highway, recreation, cemetery, and ambulance districts (Black and Peterson 2020). There are five school districts within the analysis area, which collectively comprise a total of 23 schools (K-12) (Dietrich School District 2022; Jerome School District 2022; Minidoka County School District 2022; Shoshone School District 2022; State of Idaho 2022; Valley School District 2022). The population of school-age children (under 18) in the analysis area was 15,044 in 2021 (University of Idaho Extension 2023a), and the average student to teacher ratio for the analysis area was 15.3 in the 2021–2022 school year (University of Idaho Extension 2022b).

Law enforcement in the analysis area is provided by various state, city, and county police departments operating within their respective jurisdictions. As of 2021, the tri-county analysis area had an average of 1.9 police officers for every 1,000 people (University of Idaho Extension 2023c).

Fire response in the analysis area is provided by a number of agencies under several mutual aid and cooperative agreements (SWCA 2021b). Local fire protection organizations include city, county, and rural fire departments as well as the Notch Butte Rangeland Fire Protection Association. See Section 3.7.1 (Wildfire Ignition, Spread, Response, and Suppression) for additional information regarding fire response.

Table 3.6-2. Employment and Housing Characteristics in the Analysis Area

Area	Total Population	Unemployment Rate (%)	Total Housing Units (No.)	Vacant Housing Units (no. [%])	Homeowner Vacancy Rate (%)	Rental Vacancy Rate (%)	Hotels, Motels, and RV Parks (no.)*	Housing Affordability (percentage of renter-occupied units where rent is > 30% of household income)
Minidoka County	21,393	3.9%	8,198	835 (10.2%)	1.0%	7.0%	8	39.4%
Lincoln County	5,184	6.7%	1,951	153 (7.8%)	0.0%	4.3%	0	40.6%
Jerome County	24,081	3.8%	8,533	617 (7.2%)	0.8%	0.6%	6	35.6%
City of Twin Falls	51,223	4.0%	20,380	842 (4.1%)	0.3%	4.2%	36	46.1%
City of Burley	11,274	4.0%	4,086	236 (5.8%)	0.3%	9.0%	10	40.3%
Analysis area total	**113,155**	**N/A**	**43,148**	**2,683 (6.2**%)	**N/A**	**N/A**	**60**	**N/A**
State of Idaho	1,811,617	4.0%	742,145	85,044 (11.5%)	0.9%	4.0%	N/A	45.0%

Sources: Google Maps (2023); U.S. Census Bureau (2022); Visit Idaho (2023).
Note: N/A = not available.
* Numbers are approximate.

3.6.2.1.1 EXISTING AND FUTURE TRENDS AND ACTION

The population growth that has occurred to-date within the analysis area has had a commensurate effect on the demand for and availability of community services such as public schools and law enforcement. Existing and future trends and actions have helped to accommodate population growth through the improvement or creation of public infrastructure and facilities (e.g., roads, utilities, irrigation canals) and by providing local and regional jobs. The existing effects of climate change on public resources (e.g., water supplies and public land) has and would continue to present management challenges for local governments, particularly in adapting and responding to increased wildfires and droughts.

3.6.2.2 Impacts

3.6.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and local employment, population, and housing availability would only be affected by existing and future trends and actions.

3.6.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction

Construction of the project under Alternative B would result in the hiring of both local (i.e., already residing in the analysis area, including the towns of Twin Falls or Burley) and non-local construction workers. MVE would hire as many local workers as possible. However, qualified workers are likely to come from areas outside the analysis area because of the specific specialized skills and trades required and the relatively remote project location. Most non-local construction workers would be from sufficiently distant areas and would reside in the analysis area during construction. Project construction is estimated to take 2 years, with approximately 400 to 850 workers on-site during construction (an approximately 0.35%–0.75% increase in total population of the analysis area) and an average of 625 workers on-site throughout construction (an approximately 0.55% increase in total population of the analysis area). Because of the need for a relatively specialized construction workforce and to provide a conservative assessment of employment and related impacts, this analysis assumed all workers would be non-local, and unemployment in the analysis area would remain unchanged.

Assuming all workers are non-local and that each worker would occupy one housing unit, there are sufficient vacant housing units available in the analysis area (approximately 2,683 vacant housing units) to support construction workers temporarily relocating to the analysis area during both peak construction and average construction periods. Additionally, construction workers would likely use other forms of transient accommodations (such as hotels, motels, recreational vehicle parks, and campgrounds) or find temporary housing in surrounding jurisdictions that are outside the analysis areas but within reasonable commuting distance. Given the already low vacancy rates for housing in the analysis area, the increased demand for housing that would result from the influx of non-local construction workers could increase housing prices and associated housing affordability percentages shown in Table 3.6-2 and could increase the demand for local social services.

During construction, the estimated 0.35% to 0.75% increase in total population of the tri-county area could increase the demand for community services in the local area (e.g., public schools and law enforcement); however, the increased demand is not expected to overwhelm the service providers' existing operational capacities or require a need for additional resources. Some public schools in the tri-county area could see an increase in enrollment due to non-local workers bringing their families with them; however, not all construction workers would have children or relocate their children with them (trade workers are expected to work for a subset of the construction phase when their trade is needed). For the purpose of analysis, if it is conservatively assumed that 50% of all construction workers brought one child under the age of 18 with them, then the number of children in the analysis area would increase by up to 425, which is 2.8% above the existing population (15,044 children as of 2021) (University of Idaho Extension 2023a). Given that the average student-to-teacher ratio for the analysis area is 15.3 (University of Idaho Extension 2023b), the increase in the under age 18 population would increase the student-to-teacher ratio slightly to approximately 15.7. The increase in the analysis area's population during construction could also increase demands on local law enforcement. An increase of 400 to 850 people in the analysis area during construction would slightly reduce the number of police officers per 1,000 people to approximately 2.0 (compared to 1.9 in 2021) (University of Idaho Extension 2023c).

Increased human activity and use of equipment during construction would increase the potential for fire ignitions and the need for fire response services. Although the additional access road network would facilitate increased ground access for fire responders and reduced response times, aerial fire suppression activities would be inhibited. Overall, the project would increase demands on local fire departments and would complicate fire resource allocation decisions. See Section 3.7.1 for additional information regarding potential project-related effects on wildfire ignition, spread, response, and suppression.

Table 3.6-3 summarizes the effects of the project on community services, employment, and housing availability across all the action alternatives. The potential effects of project-generated solid or hazardous wastes on disposal facilities are analyzed in brief in EIS Appendix 3; see AIB-45 and AIB-46, as well as potential effects of project-generated truck traffic on public road conditions and maintenance needs (AIB-37, AIB-38, and AIB-39) and potential effects of the project on local emergency response providers (AIB-11).

Table 3.6-3. Summary of Impacts to Community Services, Employment, and Housing Availability in Analysis Area

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Increase in employment	Most construction workers would be non-local, and unemployment in the analysis area would remain unchanged. Operational workforce would be local but would be too small to affect employment rates in the analysis area.	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
Increase in population	0.35%–0.75% increase during construction 0.02%–0.07% increase during operation	Same as Alternative B	Construction and operational workforce would be reduced by approximately 100 to 150 workers during construction and 3 to 13 workers during operation, when compared to Alternative B.	Same as Alternative D	Same as Alternative D
Change in housing availability	Sufficient vacant housing units are available to support construction and operation workforce.	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
Increase in annual tax revenues	Operation of the project would increase direct annual tax revenues for local tax districts in the tri-county analysis area by more than $3.6 million.	Local tax revenues from the project would be reduced compared to Alternative B due to fewer turbines and fewer siting corridors.	Local tax revenues from the project would be reduced compared to Alternatives B and C due to fewer turbines and fewer siting corridors.	Same as Alternative D	Same as Alternative D
Increased mileage of new roads open to the public	Long-term addition of 486 miles of new roads open to public	Long-term addition of 360 miles of new roads open to public	Long-term addition of 270 miles of new roads open to public	Long-term addition of 272 miles of new roads open to public	Long-term addition of 277 miles of new roads open to public

Operation

Operation of the project would result in the long-term employment of workers. Project operation is estimated to last 30 years, with approximately 20 to 75 workers (an approximately 0.02% to 0.07% increase in current population in the analysis area) employed throughout operation, which is well within projected growth rates for the state and counties (see Section 3.6.2.1 [Affected Environment]). Since there are few operational workers required, employment rates in the analysis area would remain unchanged. Similarly, the increase in population by up to 75 workers is not expected to result in noticeable increases in the demand for community services such as public schools or law enforcement. In addition, community service providers would benefit from increased tax revenues during operation of the project. The project is estimated to increase direct annual tax revenues for local tax districts in the analysis area by more than $3.6 million (Black and Peterson 2020). This comprises approximately $850,000 for local K-12 school districts, approximately $1.5 million for local counties, approximately $560,000 for local highways districts and approximately $150,000 for local fire districts, with the remainder going to other local ambulance, cemetery, or recreation tax districts (Black and Peterson 2020). These increased tax revenues would help to mitigate for any increased demands placed on community services during project operation.

The long-term addition of 486 miles of new roads that are open to the public could increase demands on local law enforcement; however, many of the new roads built for the project would be gravel roads mostly used for project access and are expected to have low use. Project-related increases in local tax revenues would help mitigate any increased demands placed on local law enforcement. MVE's applicant-committed measure 37 (see Table App4-2e in EIS Appendix 4) would minimize the amount of new roads to the extent practicable, which in turn would minimize the potential for increased demand on local law enforcement.

Assuming each worker would occupy one housing unit, there are sufficient vacant housing units available in the analysis area (approximately 2,683 vacant housing units) to support operational workers during this 30-year period. These workers are more likely to occupy permanent, non-transitory housing.

Alternative B with Additional Measures

No additional project-specific mitigation measures related to community services, employment, or housing availability would be required by the BLM for Alternative B.

3.6.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, the estimated construction and operation workforce would be the same as Alternative B. Therefore, potential impacts to employment and housing would be the same as Alternative B. Potential impacts to community services would largely be the same as Alternative B, with the exception that the mileage of new roads open to the public would be reduced by 126 miles compared to Alternative B, and that local tax revenues from the project would be reduced due to fewer turbines and fewer siting corridors.

3.6.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Under Alternative D, the estimated construction and operation workforce would be reduced by approximately 100 to 150 workers during construction and 3 to 13 workers during operation, when compared to Alternative B. These reductions in workforce numbers are minor, and the potential impacts to employment and housing would remain the same as Alternative B. The mileage of new roads open to the public would be reduced by 216 miles compared to Alternative B, and the local tax revenues from the project would be reduced due to fewer turbines and fewer siting corridors. Therefore, Alternative D would result in reduced demands for community services due to reduced workforce numbers and new roads, but would also provide reduced benefits to community services from tax revenues. Under Alternative D, the amount of annual tax revenue for local districts would likely be less than Alternatives B and C.

3.6.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Impacts would be the same as Alternative D. Local tax revenues would be similar to those generated by Alternative D due to the similar siting corridors footprint.

3.6.2.2.6 PREFERRED ALTERNATIVE

Impacts would be the same as Alternative D. Local tax revenues would be similar to those generated by Alternative D due to the similar siting corridors footprint.

3.6.2.2.7 CUMULATIVE IMPACTS

Reasonably foreseeable transportation, utility, wind, and solar projects would influence local community services, employment, and housing in the analysis area by providing local and regional jobs, helping to accommodate projected population growth in the analysis area (e.g., transportation and utility improvements), and by generating local tax revenues (e.g., wind and solar projects) that would provide a benefit to community services. The demand for community services and housing may temporarily increase during construction of reasonably foreseeable projects if there is an influx of non-local workers to the tri-county analysis area. When combined with the effects of the Lava Ridge Wind Project, the cumulative impact of increased demand on community services and housing could be exacerbated if multiple projects were under construction at the same time, including the potential for increased housing prices, reduced housing affordability, and increased demand for local social services. However, construction activities would be short term and would not cause a long-term adverse impact to community services and housing. Additionally, the combined tax revenues of the project and other foreseeable wind or solar projects would provide funds for local tax districts that would help mitigate the increased demands placed on community services during potential periods of concurrent construction.

Future climate change–related effects on public land and resources would present management challenges and financial burdens on local governments and community service providers such as fire departments and water districts as they adapt and respond to increased wildfires and droughts. As described in Section 3.4 (Climate and Greenhouse Gases), the project would generate energy from a renewable resource and would result in substantially less GHG emissions than if the same amount of energy were generated by fossil fuels. Avoided GHG emissions from the project would incrementally contribute to the minimization of future projected climate change-related effects, which would benefit local governments and community service providers in the analysis area. While all action alternatives would result in avoided GHG emissions and associated climate change benefits, Alternative B would result in the greatest amount of avoided GHG emissions, and Alternative D would result in the least amount.

3.6.2.3 Significance Determination

Under all action alternatives, potential adverse effects to community services, employment, or housing availability would not be significant. There would be a short-term increase in population during the construction and decommissioning phases that would increase the demand for community services such as public schools or law enforcement; however, a long-term population increase and demand for community services is not anticipated. The project would also have beneficial long-term effects on community services from increased tax revenues over the life of the project.

3.6.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The project would not have irreversible or irretrievable effects on community services, employment, or housing availability.

3.6.3 Local and Regional Economy

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.6-4.

Table 3.6-4. Analysis Approach for Local and Regional Economy

Issue Analyzed in Detail	How would project-related spending directly (wages, spending on materials and equipment) or indirectly (taxes on goods and services) contribute to the local and regional economy during construction and operation? Section 3.9.1 (Grazing Allotments and Range Socioeconomic) provides additional analysis of project-related effects on grazing permittees and the local livestock grazing economy.
Associated Issues Analyzed in Brief	Same as community services, employment, and housing availability (see Section 3.6.2).
Analysis Area	The tri-county area (Lincoln, Jerome, and Minidoka Counties) where local economies could be affected by the project. Additionally, the towns of Twin Falls and Burley, which are just outside the tri-county analysis area but are within approximately 10 miles of the project, may also be affected by project-related effects on the local and regional economy; these two communities have been considered in the impacts analysis wherever appropriate.
Indicators	Dollar amount of increase and/or decrease in economic activity associated with the project.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Described in section text.
Assumptions or Approach	Same as community services, employment, and housing availability (see Section 3.6.2).

3.6.3.1 Affected Environment

General economic characteristics of the analysis area are presented in Table 3.6-5. The top employment sectors in the analysis area include agriculture, forestry, fishing and hunting, and mining; educational services; and health care and social assistance, with median earnings for workers ranging from approximately $27,000 to $29,000 as of 2019 (U.S. Census Bureau 2021). Existing tax revenues are not reported at the county level; however, the economy (and associated tax revenues) in Idaho is projected to increase by 2.5% in 2022 and 2023, and then by 2.9% in 2024 (Idaho Division of Financial Management 2023).

Table 3.6-5. Select Economic Characteristics in the Analysis Area

Area	Total Labor Force in 2019 (no. [% of total population])	April 2021 Employment*	Top Employment Sectors (%)	Median Earnings for Workers ($) in 2019
Minidoka County	9,911 (64.0%)	11,535	1. Educational services, and health care and social assistance: 17.2% 2. Agriculture, forestry, fishing and hunting, and mining: 16.0% 3. Manufacturing: 15.6% 4. Retail trade: 9.2%	$27,266
Lincoln County	2,664 (67.2%)	2,576	1. Agriculture, forestry, fishing and hunting, and mining: 24.3% 2. Educational services, and health care and social assistance: 19.2% 3. Professional, scientific, and management, and administrative and waste management: 9.4% 4. Construction: 9.0%	$29,083
Jerome County	11,465 (67.1%)	11,865	1. Agriculture, forestry, fishing and hunting, and mining: 21.2% 2. Educational services, and health care and social assistance: 16.8% 3. Manufacturing: 15.4% 4. Retail trade: 9.9%	$27,044

Source: U.S. Census Bureau (2021).
* Data from Bureau of Labor Statistics (2021).

3.6.3.1.1 EXISTING AND FUTURE TRENDS AND ACTION

Existing and future trends and actions have influenced the local and regional economy in various ways, such as through increased local and regional jobs and community infrastructure and associated tax revenues. In addition, the tri-county economy is influenced by regional, national, and even global trends and developments.

3.6.3.2 Impacts

3.6.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and the local and regional economy would only be affected by existing and future trends and actions.

3.6.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

Construction

The economic analysis using IMPLAN (a widely used economic impact analysis model) estimated construction of the project under Alternative B would require 1,451 job-years[2] over the 2-year construction phase, and total direct labor costs for construction is estimated to be $171.95 million for the

[2]A *job-year* is a position or job for the duration of 1 year. Jobs can be full time or part time. For example, a new construction job that lasts 6 months would be 0.5 job-year, and a job that lasts 2 years is 2.0 job-years.

project. This would translate into an average annual compensation for $118,496 per job-year, including all employer and employee benefits (Black and Peterson 2020).

For every direct job, an additional 0.63 indirect or induced jobs would be added to the economy by the project in project-related industries, services, and support businesses (such as grocery stores and restaurants) (Table 3.6-6). The project's total construction employment effect is 2,361 job-years with a total output of $555.6 million. This output value comprises estimated labor income (employee compensation and proprietor income), intermediate inputs (spending on materials and equipment), taxes on products and imports, and other property income (Black and Peterson 2020).

Table 3.6-6. Economic Impacts of 2-Year Project Construction

Impact Type	Job-Years (no.)	Labor Income ($)	Total Value Added ($)	Output ($)
Direct*	1,451	$171,953,993	$278,664,002	$425,000,008
Indirect†	432	$18,325,733	$30,790,334	$66,488,333
Induced‡	478	$14,979,025	$33,661,679	$64,114,179
Total§	**2,361**	**$205,258,751**	**$343,116,015**	**$555,602,520**

Source: Black and Peterson (2020).

* Direct effects are the immediate result of the direct spending of the project.

† Indirect effects stem from the project's purchase of goods and services from other local industries.

‡ Induced effects stem from household spending of labor income, after removal of taxes, savings, and commuters.

§ Intermediate inputs (spending on materials and equipment) are included in the total effect.

As previously noted in Section 3.6.2 (Community Services, Employment, and Housing Availability), the majority of workers would be non-local, but they would reside in the tri-county analysis area during construction; therefore, although most of the direct labor income would be distributed to non-local employees, much of the indirect and induced labor income would be distributed within the tri-county analysis area. Since some workers may reside in the nearby towns of Twin Falls and Burley, some of the direct, indirect, and induced labor income may also be distributed within these communities, as well.

During project construction, the total tax revenue is estimated to be $87.92 million (Table 3.6-7). Under Idaho law, sales, excise, and income taxes accrue to the state, and indirectly some of the revenues are apportioned to local cities and counties by legislative processes. Property tax revenues accrue to the counties in which the facilities are located (Black and Peterson 2020). Therefore, most of the taxes (approximately $84,637,889 or 96.3%) would be accrued to the state ($42,318,945 per year); revenue would be apportioned to Jerome, Lincoln, and Minidoka Counties and tax districts within the three counties (or possibly Twin Falls, Cassia, or Minidoka Counties should any operational workers reside in the nearby towns of Twin Falls or Burley). Project-related property tax revenues (approximately $3,277,752 or 3.7%) would accrue to the tri-county area ($1,638,876 per year). Table 3.6-8 summarizes the local and regional economic effects of the project across all of the action alternatives. The economic effects during decommissioning were not estimated using IMPLAN, but would likely be similar to the estimates provided for construction.

Table 3.6-7. Tax Impacts of 2-Year Project Construction by Type

Property Tax ($)	Sales/Excise Tax ($)	Income Tax ($)	Total Tax ($)
$3,277,752	$77,084,384	$7,553,505	**$87,915,641**

Source: Black and Peterson (2020).

Table 3.6-8. Summary of Impacts to the Local and Regional Economy

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Total annual economic output	$277,801,260 per year of construction (similar for decommissioning) $15,004,847 per year of operation	5%–25% reduction from Alternative B	25%–50% reduction from Alternative B	Same as Alternative D	Same as Alternative D
Total annual tax revenue generated by the project	$43,957,820 per year of construction (similar for decommissioning) $4,534,133 per year of operation	5%–25% reduction from Alternative B	25%–50% reduction from Alternative B	Same as Alternative D	Same as Alternative D

Note: Additional details on economic output and tax revenue are provided in Tables 3.6-6, 3.6-7, 3.6-9, and 3.6-10.

Operation

The annual total direct labor costs for operation are estimated to be $2.36 million for the project. This would translate into an average annual compensation for $118,000 per job, including all employer and employee benefits (Black and Peterson 2020).

For every direct job, an additional 1.65 indirect or induced jobs would be added to the economy by the project in project-related industries and support businesses (such as grocery stores and restaurants) (Table 3.6-9). The project's total operation employment effect would be 53 jobs with a total output of $15 million. This output value includes estimated labor income (employee compensation and proprietor income), intermediate inputs (spending on materials and equipment), taxes on products and imports, and other property income (Black and Peterson 2020). Assuming that all workers for operation-related jobs would reside in the analysis area, this would result in an 0.1% increase in the current population.

Table 3.6-9. Annual Economic Impacts of Project Operation

Impact Type	Jobs (no.)	Labor Income ($)	Total Value Added ($)	Output ($)
Direct*	20	$2,360,000	$4,670,666	$7,600,000
Indirect†	16	$944,741	$2,180,998	$4,933,538
Induced‡	17	$731,291	$1,329,916	$2,471,309
Total§	**53**	**$4,036,032**	**$8,180,980**	**$15,004,847**

Source: Black and Peterson (2020).

* Direct impacts are the immediate result of the direct spend of the project.

† Indirect impacts stem from the project's purchase of goods and services from other local industries.

‡ Induced impacts stem from household spending of labor income, after removal of taxes, savings, and commuters.

§ Intermediate inputs (spending on materials and equipment) are included in the total impact.

During project operation, the total annual tax revenue would be $4.53 million (Table 3.6-10). A portion of these total annual taxes (approximately $713,727 or 15.7%) would be accrued to the state each year. The remaining taxes (approximately $3,817,406 or 84.2%) would remain in the tri-county area. It should be noted that unlike the tax revenues during project construction, most of the increased tax revenues from operation would accrue to the counties through the 3% gross receipts tax.

Table 3.6-10. Annual Tax Impacts of Project Operation by Type

Gross Receipts and Property Tax ($)	Sales/Excise Tax ($)	Income Tax ($)	Total Tax ($)
$3,817,406	$565,751	$147,976	**$4,534,133**

Source: Black and Peterson (2020).

Alternative B with Additional Measures

No additional project-specific mitigation measures related to the local or regional economy would be required by the BLM for Alternative B.

3.6.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, the total economic output and tax revenues generated during construction and operation would be reduced compared to Alternative B due to fewer turbines and equipment needs and reduced generation capacity, all of which contribute to reduced project expenditures on labor, materials, and taxes. However, Alternative C construction would occur across up to 3 years, as opposed to Alternative B occurring across up to 2 years. The amount of estimated labor income, intermediate inputs, taxes on products and imports, and other property income listed in Tables 3.6-6, 3.6-7, 3.6-9, and 3.6-10 would all be reduced under Alternative C. An IMPLAN economic analysis has not been performed for Alternative C to determine the exact amount of economic effects; however, the number of turbines and generation capacity would be approximately 5%–25% reduced under Alternative C compared to Alternative B (see EIS Section 2.4 [Alternative B (Proposed Action)], EIS Table 2.4-1). Therefore, the direct and indirect economic effects of Alternative C may be reduced to a similar degree. Although total economic output and tax revenues would be reduced under Alternative C, there would still be a net economic benefit to the tri-county analysis area.

3.6.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Compared to Alternatives B and C, the total economic output and tax revenues generated from construction and operation under Alternative D would be further reduced due to even fewer construction and operation personnel, fewer turbines and equipment needs, and reduced generation capacity. The estimated workforce numbers, turbines, and generation capacity would be approximately 25% to 50% reduced under Alternative D compared to Alternative B (see EIS Section 2.4 [Alternative B (Proposed Action)], EIS Table 2.4-1). Therefore, the direct and indirect economic effects of Alternative D may be reduced to a similar degree. Although total economic output and tax revenues generated under Alternative D would be less than Alternatives B and C, there would still be a net economic benefit to the tri-county analysis area.

3.6.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The total economic outputs and tax revenues under alternative E would be essentially the same as Alternative D due to similar estimates of workforce numbers, turbines, and generation capacities.

3.6.3.2.6 PREFERRED ALTERNATIVE

The total economic outputs and tax revenues under the Preferred Alternative would essentially be the same as Alternative D due to similar estimates of workforce numbers, turbines, and generation capacities.

3.6.3.2.7 CUMULATIVE IMPACTS

Existing and future trends and actions would continue to influence the local and regional economy in various ways, such as through increased local and regional jobs and community infrastructure and associated tax revenues. In addition, the tri-county economy will continue to be influenced by regional, national, and even global trends and developments. When combined with the effects of the project, the beneficial effects on the local and regional economy from increased project-related spending directly (wages, spending on materials and equipment) or indirectly (taxes on goods and services) would be compounded.

3.6.3.3 Significance Determination

Under all action alternatives, potential adverse effects to the local and regional economy would not be significant. The project would have beneficial effects on the local and regional economy through increased economic output and annual tax revenues over the life of the project. Other types of economic effects, some of which would be adverse, but also not significant, are discussed in Sections 3.6.4 (Residential Property Values) and 3.9.1 (Grazing Allotments and Range Socioeconomics).

3.6.3.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The project would not have irreversible or irretrievable effects to the local or regional economy in terms of project-related economic outputs or tax revenues.

3.6.4 Residential Property Values

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.6-11.

Table 3.6-11. Analysis Approach for Residential Property Values

Issue Analyzed in Detail	How would the presence and operation of wind turbines affect residential property values?
Associated Issues Analyzed in Brief	Same as community services, employment, and housing availability (see Section 3.6.2).
Analysis Area	The tri-county area (Lincoln, Jerome, and Minidoka Counties) where local communities could be affected by the project.
Indicators	Results of comparable, peer-reviewed studies of effects of wind energy development on property values
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Described in section text
Assumptions or Approach	Same as community services, employment, and housing availability (see Section 3.6.2).

3.6.4.1 Affected Environment

The number of housing units in the analysis area is presented in Table 3.6-2. Existing and future trends and actions have influenced property values in the tri-county analysis area through population growth and increased demands for housing, and through the development of new or improved community infrastructure that can influence property values. The housing units in the analysis area are in generally low-density rural or suburban settings (Google Maps 2023).

3.6.4.2 Impacts

3.6.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and residential property values would only be affected by existing and future trends and actions.

3.6.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

Operation

The potential impact of wind energy projects on residential property values is often a concern near areas selected for wind projects. As described in Section 5.13.2 of BLM (2005), two studies (one conducted in 2002, another in 2003) examined potential property value impacts of wind power facilities and suggested there would be no measurable impacts. Since then, multiple economic studies using robust price models and large sample sizes have analyzed the effect of wind energy development on residential property values. These studies have had mixed results, which highlight the complexity involved in projecting changes in property values and how the effects of wind developments on property values can be highly variable both regionally and temporally and depend on the modeling methods used. Ultimately, property values are highly dependent on local market conditions and buyer perceptions.

Some studies indicate that proximity to an operating wind energy facility does not necessarily negatively influence property values or property value appreciation rates (Hinman 2010; Vyn and McCullough 2014). Additional studies, which also used robust price models and large sample sizes, did not find statistical evidence that wind projects had substantial impacts to property values (Hoen et al. 2009; Hoen et al. 2011; Hoen et al. 2013; Lang et al. 2014; Magnusson and Gittell 2012). Hoen et al. (2009) concluded that "no evidence is found that home prices surrounding wind energy facilities are consistently, measurably, and significantly affected by either the view of wind energy facilities or the distance of the home to those facilities. Although the analysis cannot dismiss the possibility that individual or small numbers of homes have been or could be negatively impacted, if these impacts do exist, they are either too small and/or too infrequent to result in any widespread and consistent statistically observable impact" (Hoen et al. 2009:75). Lang et al. (2014) evaluated the effect of wind turbines on property values in Rhode Island and found that properties within 0.5 to 1 mile of wind turbines decreased, but by a statistically insignificant amount. Further, their results showed housing prices increased within 0 to 0.5 mile of wind turbines, which was incongruent with the 0.5- to 1-mile results; the authors hypothesized this may be the result of differences in wind turbine sizes, placements, and visibility.

Other studies indicate that proximity to wind energy facilities and wind turbine visibility can negatively influence property values in some cases (Gibbons 2015; Heintzelman and Tuttle 2012; Sunak and Madlener 2013). Gibbons (2015) evaluated the effect of turbine visibility on home prices in England and Wales and found that turbine visibility reduced home prices by approximately 6% to 12% (depending on size of wind facility) where turbines were visible within approximately 1.25 miles (2 km); the effects on property values decreased as distance to turbines increased. Heintzelman and Tuttle (2012) evaluated the effect of wind energy facilities on property values within three counties in New York state. Their results found that proximity to wind energy facilities (10 miles or less) had a mostly negative effect on property values for two of the three counties, and a mostly neutral effect in the third county. Further, in all three counties, there were some positive impacts on property values within 1 to 3 miles of wind energy facilities that the authors could not explain but hypothesized may be due to consumer preferences. Sunak and Reinhard (2013) evaluated the effect of turbine proximity and visibility on property values in northern Germany. Their results found that proximity to wind turbines had a statistically significant negative effect on property values, but they did not find a statistically significant effect resulting from turbine visibility. Proximity effects were most noticeable for properties within 1 mile of the wind energy facilities, and effects decreased with increasing distance. Walker et al. (2014) found that the social dynamics of communities can influence whether or not property values are affected and to what degree; for example, if community members are concerned about the potential visual, health, or noise effects of turbines, their perceived property value loss can lead to lower asking and selling prices. Based on public comments received for the draft EIS, members of the community have expressed concern regarding the effects of the project on local property values (e.g., from noise or visual impacts, and land use conflicts), and these community perceptions of adverse effects have the potential to adversely affect property values, regardless of whether they are ever realized or not. Lastly, Brunner et al. (2024) found that homes located within 1 mile or less of commercial wind energy facilities experienced property value declines of approximately 11% following the announcement of a new wind project, but then eventually recovered and became statistically insignificant (approximately 2%) within approximately 5 years after the wind energy facilities became operational. Brunner et al. (2024) also found that homes within 1 to 2 miles of wind energy facilities experienced much smaller changes in property values, and homes 3 to 5 miles away were not affected at all.

All of the above studies discuss how several qualitative and quantitative factors influence property values adjacent to announced or operating wind energy facilities in addition to the presence of the facility itself. Examples include, but are not limited to, underlying land use of property, lot size, health of the local economy and job prospects, buyer preferences and demographics, proximity to major roads, landscape setting, and the amount of time that has passed since the wind energy facility was constructed. Considering how many site-specific factors can influence property values, extrapolating the results of the above-mentioned studies from one geography or time period to another is inherently difficult and introduces uncertainty into site-specific market predictions. Some of the housing qualities that are unique to the analysis area are not specifically reflected in the above-mentioned studies; for example, how the analysis area contains a mixture of private lands adjacent to the public lands where the project would be constructed, which means that private properties would not benefit from any lease payments, which could have counteracted some of the negative effects of turbine visibility.

As described in EIS Section 3.16 (Visual Resources), the wind turbines would be visible for most residents within the immediate foreground (0–2 miles) and foreground (2–10 miles) of the siting corridors and would result in major or moderate visual changes to landscape character and scenic quality in these areas. Therefore, it is possible that proximity and visibility of wind turbines for these residences would have an effect on their property values; however, given the lack of consensus on the subject, the likelihood or degree to which property values may or may not be affected cannot be predicted with any certainty. As outlined above, studies of how wind energy facilities affect residential property values present mixed results, with the majority showing a lack of statistically meaningful increases and decreases in the listing price and highlighting the fact that any predicted or observed property value change is also influenced by other factors. Based on these applicable studies, there is a potential for property values in the analysis area to be affected by the project under Alternative B.

Alternative B with Additional Measures

Additional project-specific mitigation measures for residential property values are summarized in Table 3.6-12 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.6-12. Mitigation for Residential Property Values

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
–	–	ggg
–	–	rrr
–	–	sss

Note: All measures are detailed in EIS Appendix 4.

These additional measures would further reduce the potential for turbines to visually impact surrounding residences, which in turn would reduce the likelihood or degree of influence that turbine visibility could have on property values.

3.6.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Potential impacts on residential property values would be the same as described for Alternative B with Additional Measures. Alternative C would implement the same additional measures, which would similarly reduce the likelihood or degree of influence that turbine visibility could have on property values.

3.6.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Potential impacts on residential property values would be the same as described for Alternative B with Additional Measures. Alternative D would implement the same additional measures, which would similarly reduce the likelihood or degree of influence that turbine visibility could have on property values.

3.6.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Potential impacts on residential property values would be the same as described for Alternative B with Additional Measures. Alternative E would implement the same additional measures, which would similarly reduce the likelihood or degree of influence that turbine visibility could have on property values with the second-fewest residences potentially affected.

3.6.4.2.6 PREFERRED ALTERNATIVE

Potential impacts on residential property values would be the same as described for Alternative B with Additional Measures. The Preferred Alternative would implement the same additional measures, which would similarly reduce the likelihood or degree of influence that turbine visibility could have on property values with the fewest residences potentially affected.

3.6.4.2.7 CUMULATIVE IMPACTS

Ongoing population growth would continue to influence property values in the tri-county analysis area by increasing the demand for housing. Reasonably foreseeable infrastructure projects could also influence property values in both positive or negative ways; however, because property values are influenced by numerous factors such as market conditions, location and neighborhood amenities, and the size, age, and condition of the home, the direct effects of infrastructure projects on property values are difficult to measure and are not always consistent or predictable. Therefore, the combined effect of reasonably foreseeable projects and any of the action alternatives on property values would be similarly difficult to predict or measure, and may not be detectable compared to other influential factors.

3.6.4.3 Significance Determination

Under all action alternatives, residential property values throughout the analysis area would not be significantly impacted by the project. Individual property values could be impacted by the project under each action alternative; however, the complex influencing factors, lack of statistically meaningful increases or decreases in residential property values, and the mixed results of studies do not allow for predicting the likelihood or degree of the impact with certainty. The spatial extent that property values could be affected would be dependent on the proximity and visibility of wind turbines to individual residences and perception of potential purchasers and sellers. Although there were mixed outcomes from studies, most studies found that impacts to property values occurred within a few miles of a project and did not identify regionwide impacts to property values. The duration of the impact may also vary based on multiple factors and perceptions, with one study finding that property values that initially decreased recovered after a period of 5 years (Brunner et al. 2024).

3.6.4.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives could irretrievably impact residential property values throughout the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) primarily due to turbine visibility. However, the likelihood or degree to which individual property values may or may not be irretrievably affected cannot be predicted with any certainty. Long-term irretrievable effects could occur for affected residences until project infrastructure is removed and final reclamation is completed.

3.7 FIRE AND FUELS MANAGEMENT

3.7.1 Wildfire Ignition, Spread, Response, and Suppression

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.7-1.

Table 3.7-1. Analysis Approach for Wildfire Ignition, Spread, Response, and Suppression

Issue Analyzed in Detail	How would the project affect the risk of human-caused or natural-caused wildfire ignition and spread in the analysis area and wildfire response and suppression efforts?
Analysis Area	Area within 20 miles of the siting corridors (Figure 3.7-1). This is the area within which potential impacts from the project on fire and fuels management could occur. This area was sized to accommodate jurisdictional response areas (South Central Idaho Interagency Dispatch Center and Southern Idaho Regional Communications Center) that extend beyond the siting corridors.
Indicators	Acres of land with changes in vegetation types, fuel types, or fuel loading. Ignition potential as a result of project infrastructure (turbines and transmission lines) based on literature review of previous turbine-related lightning ignitions. Changes in the need or method of emergency response. Changes to ground access routes, emergency response time, and navigable airspace as a result of the project components (turbines, powerlines, buildings, etc.). Changes to availability of water for fire suppression.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	The Interagency Fuel Treatment Decision Support System (IFTDSS) web application (IFTDSS 2021) was used to generate projected fire behavior parameters under various fuels and climate scenarios. Modeling results are described in the *Wildland Fire Technical Report for the Lava Ridge Wind Project* (SWCA 2022), available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510). The LANDFIRE database of landcover classes (USGS and DOA 2013) and the Scott and Burgan (2005) fire behavior fuel models were used to describe existing fuels conditions in the analysis area. Federal agency data regarding fire history and IPOW[3] hazardous fuels reduction and post-fire rehabilitation were used to describe the affected environment and to build fire behavior parameters for modeling. These data included past vegetation treatments, planned hazardous fuels treatments and habitat restoration treatments, fire points of origin, fire frequency, and fire perimeters. Academic and peer-reviewed literature regarding fire history, fire regime, and fire behavior was used to describe the affected environment and analyze potential impacts. State and local government data regarding fire response resources and fire history were used to describe the affected environment and to analyze potential impacts related to fire response resources.

3.7.1.1 Affected Environment

Sagebrush ecosystems throughout the Great Basin are undergoing large-scale transformations that are impacting rangeland resources and influencing management plans and actions (Chambers et al. 2014). Fire management activities on BLM public lands are directed by the 2019 *Idaho State Office Fire Management Plan* (BLM 2019), which summarizes the applicable land use/management framework plans and focuses on vegetation treatments to change vegetation composition and structure to modify potential fire behavior, improve fire suppression effectiveness, and limit the spread and intensity of fire due to invasive grasses and conifer encroachment. Fire management activities are also directed by the 2015 *Idaho and Southern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment*,

[3] The IPOW is a compilation of planned projects to be completed on BLM public lands in the Twin Falls District, including vegetation management for hazardous fuels treatments and post-fire treatments (including seeding) shown in Figures 3.7-1 and 3.7-2. A program of work is required for any BLM program that requests directed funding. In the case of the IPOW, it is collaborative funding request for projects in the wildlife and fuels programs to restore sagebrush habitats.

which provides wildfire management objectives and decisions that both "design fuel treatments to restore, enhance, or maintain GRSG [greater sage-grouse] habitat" and "manage wildfires to minimize loss of sagebrush and protect GRSG habitat" (BLM 2015a). Past vegetation treatments, including habitat restoration, post-fire stabilization and rehabilitation, fuels treatments, and fuel breaks, have been conducted in the siting corridors as well as in the surrounding analysis area as part of the BLM's IPOW (see Figures 3.7-1 and 3.7-2).

In addition to the vegetation treatments included in the BLM's IPOW, the analysis area and siting corridors have been subject to previous wildfires, livestock grazing, and reseeding projects (see Figures 3.7-1 and 3.7-2) that have created or continue to create fluctuations in fuel loading and variations in fire threat. These actions contribute to the existing conditions for wildland fire and fuels (SWCA 2022) and are described below. For specific information on fire history, fuels and fire regime, fire behavior, and fire response, see SWCA (2022).

3.7.1.1.1 FIRE HISTORY

In the years for which wildfire data are available (1980–2022), 1,399 fires or ignitions have occurred in the analysis area (see Figures 3.7-1 and 3.7-2) (BLM 2022; SWCA 2022). The vegetation community that experienced the most fire is intermountain basins big sagebrush shrubland. In sagebrush landscapes throughout the Intermountain West, the frequency of lightning ignitions varies spatially and is influenced by geography (i.e., climate and weather patterns), topography, and fuel characteristics. Human-caused ignitions in sagebrush communities are generally associated with increased human activity along roads, residential areas, or areas frequented for recreation (Innes and Zouhar 2018). Powerlines are also a known source of ignition for wildfires.

3.7.1.1.2 FUELS AND FIRE REGIME

The term *fuels* describes both live and dead vegetation that is available for combustion and includes grass, forbs, shrubs, and timber (SWCA 2022). Vegetation (and thus fuels) in the analysis area has been altered by past fires and livestock grazing. Additionally, nonnative plants dominated by cheatgrass (*Bromus tectorum*) and crested wheatgrass are widely established in the analysis area. The BLM has also completed seeding in some parts of the analysis area (for perennial grasses and in some areas for sagebrush), including in some burn areas (see Figure 3.15-2) (BLM 2022). Areas that have been reseeded may now likely be dominated by grasslands (both native and nonnative). (Existing vegetation in the siting corridors is described in Section 3.15.1, Native Upland Vegetation Communities.) Therefore, grass fuels are the dominant fuel type in the siting corridors and analysis area. Grass fuels have a rapid rate of spread; during productive years (following wet periods), the volume of grass fuels increases, and fires exhibit greater rates of spread than during non-productive years (Rickert 2021).

Wildfires in sagebrush communities were historically infrequent, but they burned with high severity and resulted in complete mortality of impacted vegetation (Innes 2019; Innes and Zouhar 2018). However, cheatgrass, a highly competitive invasive grass species from Eurasia, has proliferated since the early 2000s and is degrading sagebrush ecosystems (Chambers et al. 2014). Cheatgrass has altered native plant community structure throughout the West and promotes wildfire by creating continuous fuel loads and promoting shorter fire return intervals (Bishop et al. 2019; Zouhar 2003). The shorter fire return intervals and larger fires, in turn, degrade vegetive communities. For instance, the increased frequency may inhibit the establishment of native woody shrubs, such as sagebrush, and native grasses by both destroying seed sources and killing recently established plants (Innes 2019; Zouhar 2003). Loss of sagebrush due to the interaction between fire and invasive plant establishment habitat is having substantial impacts on obligate species in sagebrush ecosystems, such greater sage-grouse (BLM 2015a). Wildfire management on BLM public lands in Idaho is conducted in manner that considers wildfire impacts on greater sage-grouse.

Currently, BLM (2015a) provides wildfire management objectives and decisions that are designed to both "design fuel treatments to restore, enhance, or maintain GRSG habitat" and "manage wildfires to minimize loss of sagebrush and protect GRSG habitat" (BLM 2015a).

Finally, human presence has extended the fire season beyond the period in which natural ignitions occur. Fire ignitions no longer depend only on natural starts; human-caused fires have greatly extended the frequency and seasonality of fires in the area.

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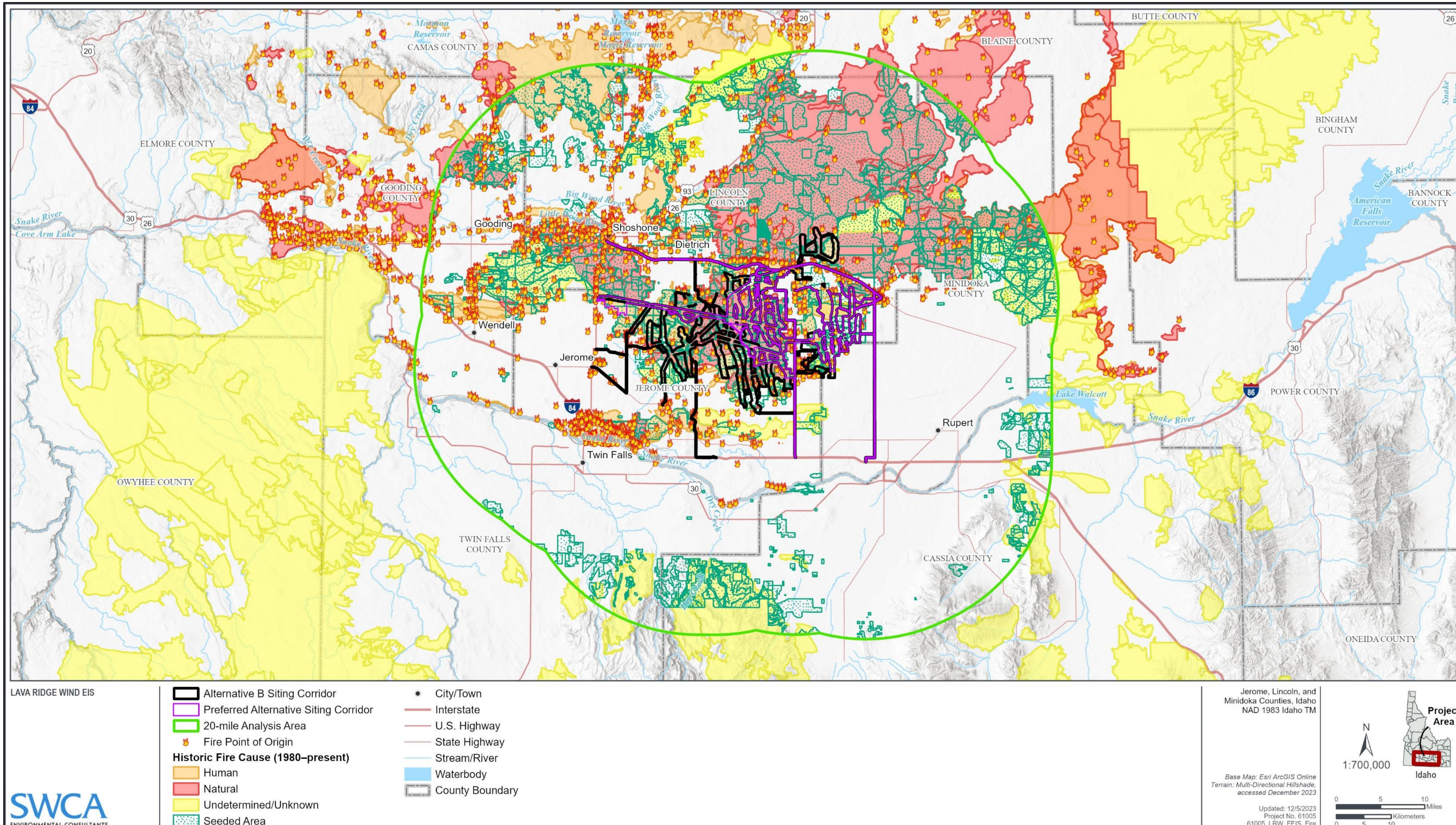

Figure 3.7-1. Cause of historic fires and seeded areas (as part of the integrated program of work) in the analysis area.

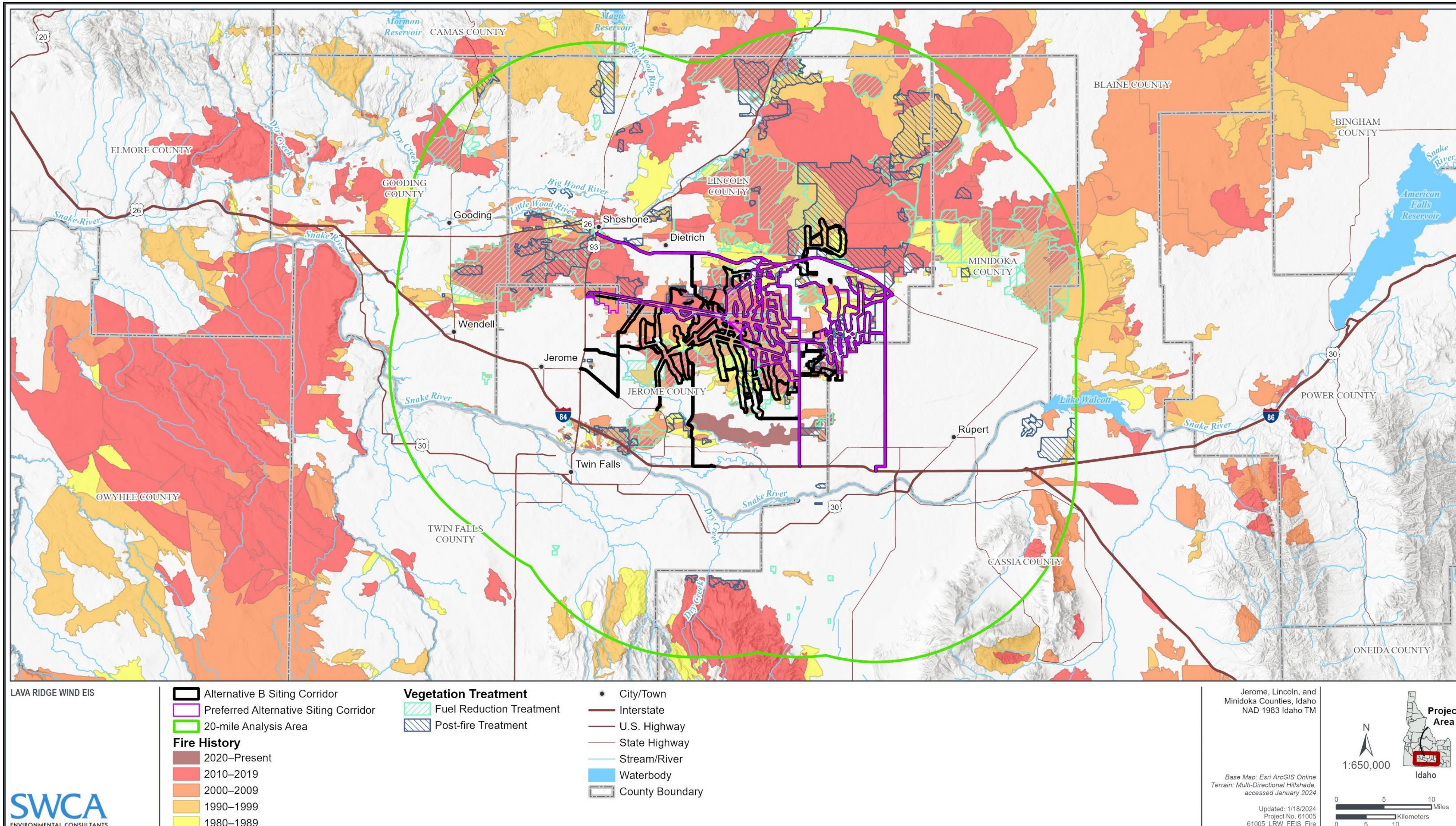

Figure 3.7-2. Fire history and vegetation treatment (as part of the integrated program of work) in the analysis area.

3.7.1.1.3 FIRE BEHAVIOR

Several variables, including weather, topography, condition, and arrangement of fuels, affect fire behavior on a site and over a landscape. Fire behavior is described in terms of potential flame lengths, intensity of the fire, and rates of spread as predicted using fire behavior modeling. Fire behavior modeling completed for the project (see Figures 5–9 in SWCA [2022]) indicates that flame lengths in the analysis area would vary from 0 to 1 foot to more than 8 feet under existing fuels conditions, and in some limited areas (areas dominated by shrub fuel models) could be up to 25 feet. The greatest fireline intensity (defined as the rate of energy or heat released per unit of time British Thermal Unit per foot per second) is predicted to occur in grass and shrub vegetation. Because of the dominance of grass fuels in the analysis area (see Figure 4 in SWCA [2022]), fires are predicted to have rapid rates of spread of more than 150 chains per hour (a chain is equal to 66 feet and is a measure used by wildland fire fighters to represent fire spread). Figure 3.7-3 shows the modeled rate of spread under a high production scenario (i.e., a scenario where vegetation production is high and grass fuels increase). See Figure 8 in SWCA (2022) for modeled rates of spread under a moderate production scenario.

3.7.1.1.4 FIRE RESPONSE

Fire behavior is an important component of fire suppression strategies and tactics. Under existing conditions, fire behavior modeling outputs suggest that some fires in the siting corridors and adjacent analysis area could be controlled effectively with bulldozers or engines using direct attack tactics. However, in areas where modeling outputs show that flame lengths would exceed 8 feet (> 70 % of the analysis area; see Figure 6 in SWCA [2022]) and where extreme rates of spread are predicted (> 90% of the analysis area; see Figure 8 in SWCA [2022]), more indirect suppression strategies would be required, and aviation resources could provide added support. The analysis area is in the BLM Twin Falls District, in which previous fires have grown to more than 10,000 acres within 36 hours of ignition (BLM 2019). With such rapid growth rates, rapid response by firefighting resources is critical.

Fire response in the analysis area is provided by a number of agencies under several mutual aid and cooperative agreements (SWCA 2022). Local fire protection organizations include city, county, and rural fire departments as well as the Notch Butte Rangeland Fire Protection Association. The capabilities and availability of these resources to respond to wildfire vary due to the availability of volunteer firefighters and access to appropriate equipment. Wildland firefighting assets are located throughout the analysis area to support initial response to wildfire following the closest forces concept, under which the closest firefighting assets are used regardless of agency to minimize response times to an incident (see Figure 3.7-4). Response times to fires in the siting corridors would be heavily contingent on the availability of local, state, and federal responders; the location of a fire; and the jurisdictional boundaries for each fire response agency. Aerial suppression resources for the BLM Twin Falls District are provided through a joint aviation program with the Sawtooth National Forest. During peak fire season, the availability of ground and aerial resources may be limited.

Firefighting tactics in the analysis area may currently be influenced by the presence of existing powerlines and related structures. Ground and aerial resources often take specific measures when engaging in suppression activities near powerlines, such as increased distance to electrical-related structures and localized use of water and retardant. FAA regulations do not limit the proximity of aircraft to tall structures for fire suppression and engagement is at the pilot’s discretion.

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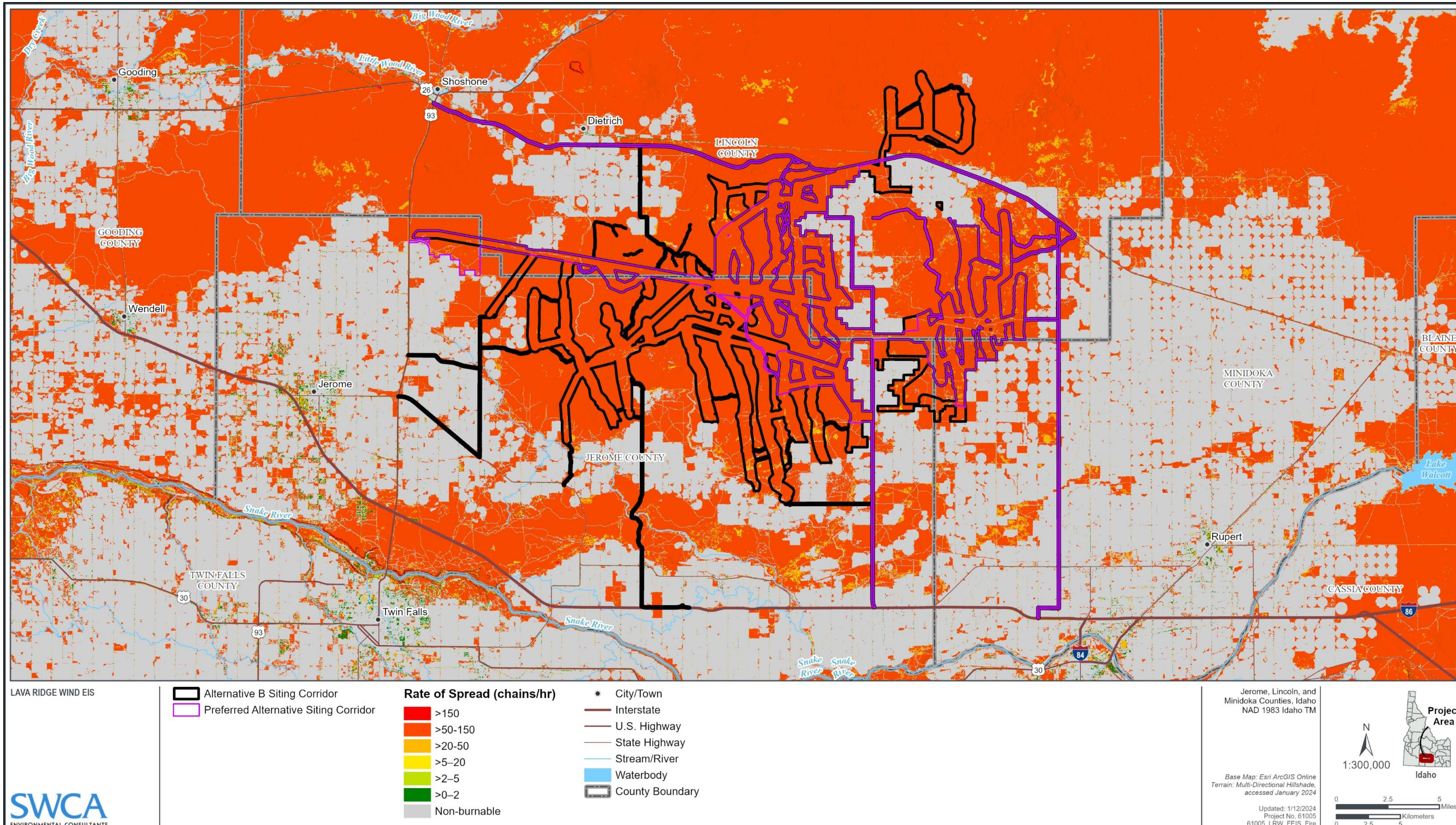

Figure 3.7-3. Modeled rate of spread modeled in siting corridors under a high-production scenario.

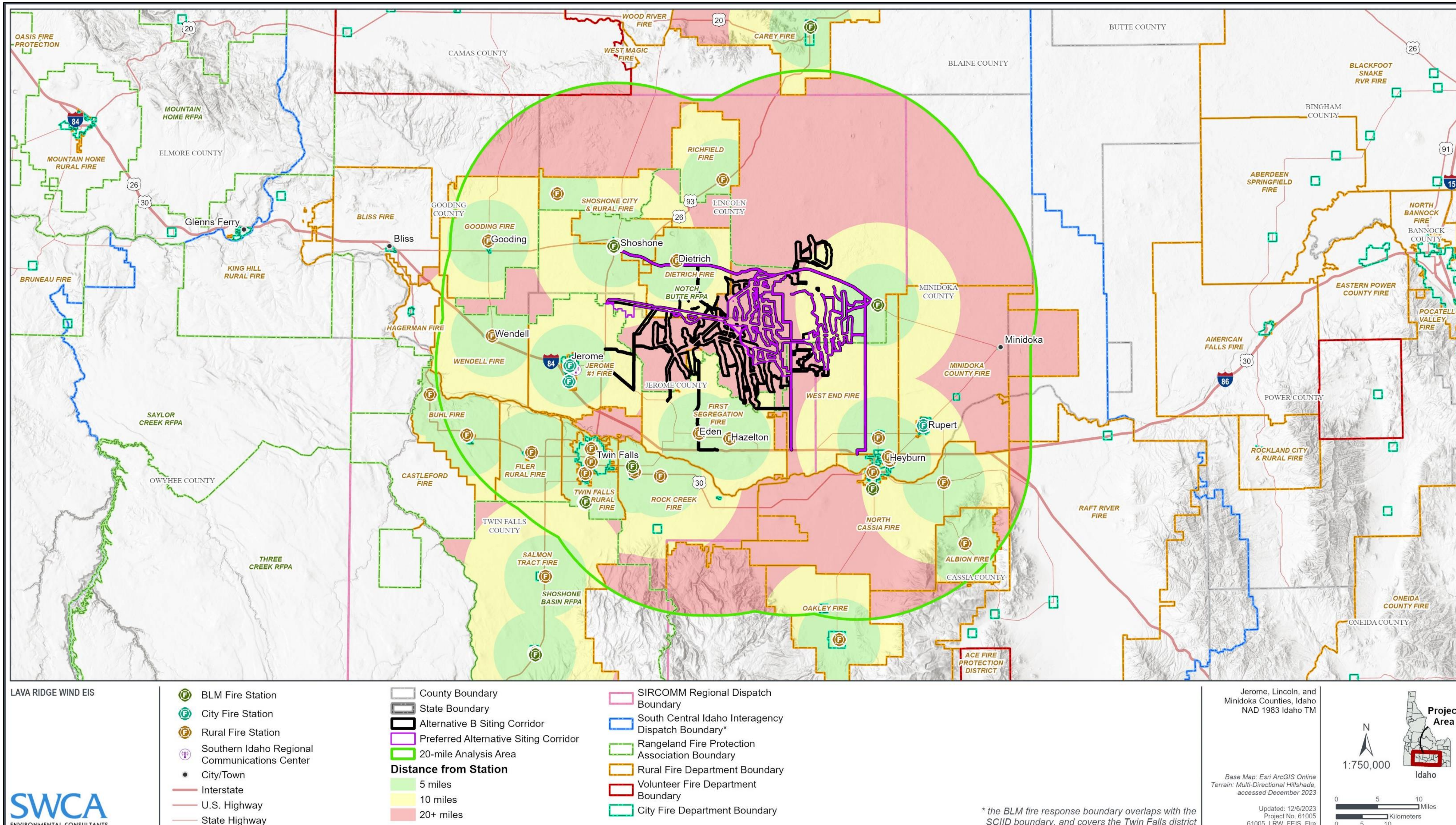

Figure 3.7-4. Fire response in the analysis area for the South Central Idaho Interagency Dispatch Center response area.

3.7.1.1.5 EXISTING AND FUTURE TRENDS AND ACTION

Trends and actions in the analysis area (as described in EIS Section 3.1.1 [Existing and Future Trends and Actions]) affecting fire and fuels management include the following:

- Climate change trends of predicted increased drought and warming and increased frequency and severity of wildfire
- Continued vegetation treatments (fuels and vegetation management, ESR, and reseeding) on public and private lands
- General population growth, especially in wildland-urban interface areas
- Increased renewable energy development
- Increased electrical infrastructure
- Commercial expansion along I-84 and U.S. 93
- Construction of existing and proposed linear features (e.g., roads, railroads) and roadway improvement projects

Collectively, these trends and actions have and would continue to add to increased potential ignitions sources as a result of human incursions or equipment- and infrastructure-related ignitions, reduce fuel continuity, alter fuel volume and arrangement as a result of vegetation disturbance, increase the presence and spread of nonnative species due to disturbance-related infestations that may alter natural fire regime, and alter access for fire response and suppression resources as a result of altered road networks and presence of turbines and other infrastructure within aviation air space.

Ongoing climate trends of increasing drought and higher incidence and severity of wildfire (see Section 3.4 [Climate and Greenhouse Gases]) will also impact fuels in the analysis area as fires become more frequent and have more potential for rapid spread and severe fire effects. This will place increased demand on fire suppression resources, particularly if there is overlap in construction for adjacent projects. Greater fire frequency and severity will increase the potential for infestations by invasive plant species over large areas.

As described in Section 3.7.1.1 (Affected Environment), past vegetation treatment and ESR projects have altered the fuels in the analysis area and are intended, to a degree, to restrict the rate of fire spread. Approximately 32% of the analysis area (including 76% of the siting corridors) has previously been burned or has had past vegetation treatment. In all, 30% of the analysis area (including 74% of the siting corridors) has been reseeded (for perennial grasses and in some areas for sagebrush).

Future development in the analysis area is likely to include planned renewable energy projects, improvements to U.S. 93 between I-84 and ID 25, improvements to the I-84/ID 50 interchange, construction of the SWIP-North transmission line, and construction of the Gateway West transmission line. The 1,500-MW Taurus Wind Project is proposed on land immediately west of the siting corridors and falls partially in the analysis area. These projects would add more roads and transmission lines, increase ground and vegetation disturbance, and increase human activity in the analysis area. These factors would likely increase the abundance of fine fuels (mostly from invasive plants) and contribute to increased potential of wildfire ignitions from human-related activity and project infrastructure. However, installation of new infrastructure, such as roads, would clear vegetation and could reduce fuel continuity locally. Fragmenting the fire landscape may not always result in an effective fuel break because many additional factors, such as fire behavior, wind, and weather conditions, influence this. Overall, future energy and infrastructure development would likely increase probability of ignitions in the analysis area and increase the abundance of fine fuels, though fragmentation of the analysis area could have a variable impact on the probability of wildfire spread.

3.7.1.2 Impacts

3.7.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and human-caused or natural-caused wildfire ignition and spread and wildfire response and suppression efforts would only be affected by existing and future trends and actions.

3.7.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Ignition

During construction and decommissioning (approximately 2 years for each), there could be increased incidence of ignition from vehicle and equipment use, cigarettes or other ignited materials, construction equipment use in dry areas that may spark a fire, accidental ignition of flammable liquids, and mechanical malfunction.

Human activity and equipment use would be elevated in the siting corridors, particularly during construction. The area already experiences high numbers of human-caused fires that are highly correlated with road access. Increased road networks throughout the siting corridors would increase access, traffic, and human presence to the area, which would further elevate human-caused ignitions. The wind turbines would also result in heightened ignitions risk. Although risk of fire associated with wind turbines is not well documented (Uadiale et al. 2014), available data show that, after blade failure, fire is the second cause of accidental failure in turbines. Fires in wind turbines are most often caused by lightning strike, electrical malfunction, mechanical malfunction, or issues with maintenance. Only one in 1,700 to 2,000 wind turbines catches fire each year, so the potential for a single turbine to catch fire is relatively rare (fewer than one in 2,000, or less than 0.01%) (Uadiale et al. 2014). Fire protection within each turbine is contingent upon early fire detection, automatic fire suppression systems, and turbine type (gear-driven systems having a greater fire risk than direct drive systems) (Uadiale et al. 2014). New technology is continually advancing in systems that can automatically detect and suppress fires in wind turbines to further reduce risk of wildfire.

Because of their tall size relative to their surroundings, turbines are subject to elevated incidence of lightning strikes (Montanya et al. 2014; Pineda et al. 2018). Turbines and blades are designed to withstand a certain severity of lightning that helps prevent against damage from strikes and controls the flow of electricity through the blade, safely conducting it to earth (Vella 2021).

BESSs can pose various fire hazards. First, the battery cell can self-heat and generate enough heat that it surpasses the amount that can be dissipated. This heat can propagate to nearby cells and escalate throughout the BESS. The battery cell can also release flammable and/or toxic gases such as carbon monoxide, carbon dioxide, hydrogen, methane, ethane, and other hydrocarbons. The heat emitted by the batteries can attain temperatures high enough to ignite these gases. This process also has the potential for explosion hazards if the flammable gases reach a lower explosive limit before encountering an ignition source. Even after a fire incident and damage to battery terminals, fire hazards from BESS can persist. Stranded energy, energy stored in a battery that cannot safely discharge, is common after BESS fires or damage. This condition can create spark and shock hazards that persist for minutes to days after the initial event, potentially reigniting fires within and around a BESS facility (National Fire Protection Association

2021). Though few data are available regarding the frequency of BESS fires, one study found that nearly 1 out of every 100 MWh of installed BESS capacity failed due to fire during an 18-month period in 2019–2020 (Electric Power Research Institute 2021). However, BESS fire protection technology has advanced rapidly, and new NFPA standards for BESSs were implemented shortly after the data for this study were collected (National Fire Protection Association 2020). Thus, current BESS fires rates are likely lower.

The implementation of applicant-committed measures to avoid and minimize human-caused ignitions and protect tall and electrical infrastructure from lightning (measures 49, 53 through 56, and 58) would help reduce the potential for elevated ignitions (see Table App4-2 in EIS Appendix 4). Constructing the wind turbines and BESS in accordance with the latest safety codes; regularly inspecting fire response equipment, storage areas with flammable fuels, and all project infrastructure (including the wind turbines and BESS); and using real-time monitoring and control equipment to automatically or remotely shutdown the wind turbines and BESS in the event of a fire or other emergency would further reduce the risk of human-caused ignitions and allow for more rapid and effective suppression if an ignition occurs (applicant-committed measure 52). In addition, measures to bury overhead lines would also minimize the risk of increased ignitions (applicant-committed measure 29 and BLM-required measure D). Measures 66 through 77 and 82 would ensure that flammable hazardous materials and waste are handled and disposed of in a safe and proper manner, reducing the in-situ wildfire hazard environment during construction and operation. Measure 85 (a blasting plan) would decrease the likelihood of blasting resulting in incidental wildfire ignition. These measures would reduce but not eliminate the potential for project-related ignitions.

Naturally ignited wildfires due to lightning could occur at any time during the spring, summer, or fall in or around the siting corridors.

Spread

Historic fire data coupled with fire behavior modeling suggest that the overall wildfire hazard in the analysis area would be moderate to high, with flame lengths ranging from 4 feet to greater than 8 feet, and rates of spread in excess of 150 chains per hour, limiting resistance to control (SWCA 2022). High wildfire frequency over the last 40 years suggests wildfires will continue to be a frequent hazard for the analysis area, and the potential for large fire spread is high, as has been observed on some recent fires.

Fire rate of spread is predicted to be high throughout the analysis area because of the dominance of grass fuels (see Figure 3.7-3). The greatest fireline intensity and flame lengths are predicted to occur in areas with grass and shrub vegetation, which are classified as grass-shrub (GS2) fuels. Vegetation removal, installation of infrastructure, creation of roads and other areas of ground disturbance, and ongoing maintenance activities would result in short-term fragmentation of vegetation communities and, potentially, a partial reduction in fuel continuity. Under favorable conditions (e.g., high fuel moisture, low fuel loading, humid conditions, and low winds), this could mitigate fire behavior and impede wildfire spread, particularly in the short term (1–6 years postconstruction or post-disturbance). If, however, invasive plants, such as annual grasses, become prevalent in interim reclamation areas and disturbed sites, fine fuel loading could vary considerably from year to year, resulting in potentially higher fuel continuity than the preconstruction conditions several years after the disturbance.

However, even with the fragmentation of the vegetation, wildfires could cross cleared vegetation during high wind events. This would be especially relevant during high vegetation production years with subsequent dry summers and/or falls. For most of the siting corridors, flame lengths are modeled to exceed 8 feet, with other substantial portions having flame lengths that could reach and/or exceed 25 feet. Fuel breaks typically need to be several hundred feet wide and have a strategic placement and design in order to function most effectively (BLM 2015b). Although project infrastructure, such as roads and work areas, may fragment vegetative communities, they should not be considered fuel breaks. A wildfire with tall flame lengths and a fast rate of spread could easily cross narrow maintenance and/or access roads and temporary work areas, especially if these areas are less than 25 feet wide. Furthermore, wildfires with fast rates of spread and tall flame lengths also yield substantial ember spotting potential risk, where embers would likely traverse roads or other cleared areas and result in subsequent ignitions and spread.

In areas not impacted by vegetation removal or construction, residual fuels would continue to contribute to ongoing fire risk. Fires may originate from outside the siting corridors, spread into the area, and impact the project infrastructure; fires that originate within the siting corridors may spread to outside areas. Fire behavior modeling of existing fuels in the siting corridors and under a 97th percentile scenario suggests high to extreme spread rates could occur, especially in areas of continuous fuels and under years that exhibit high production of fine fuels (see Figure 3.7-3). Most GS2 fuels occur in the western and northern portions of the siting corridors. Fragmentation of fuels from project construction and maintenance may indirectly reduce fuel continuity fuel type; however, effective fuel breaks typically need to be several hundred feet (range from 100 to 300 feet) wide and have a strategic placement and design in order to function (BLM 2015b). The project could also increase risk of wildfire ignition in this relatively high-risk fuel type.

Furthermore, any substantial fires that result from or are caused by project activity or infrastructure would result in smoke impacts on the surrounding landscape and region. Large wildfires have been directly linked to poor air quality and have led to adverse physical and mental health effects and costs to society (EPA 2023).

Response and Suppression

The topography in the area and the addition of access roads for infrastructure operation would increase the accessibility of most areas to fire responders by ground operations, which would decrease response times and increase potential ground suppression strategies for fire containment. However, navigation in the area would change for fire responders, and aerial resources could be more limited in their ability to respond due to the presence of turbines and associated infrastructure in the airspace around the siting corridors. Overall, the project would complicate fire resource allocation decisions because there would be new infrastructure at risk, and decision-makers would need to consider this when prioritizing active fire events that require response resources.

Improved access under Alternative B may help moderate fire size by increasing the capability of the existing on-the-ground emergency service providers; however, the potential for increased ignitions resulting from project activities could stretch response resources particularly if multiple fires are burning in the BLM Twin Falls District. Responding to fires on the wind turbines would prove especially difficult because most turbine fires occur in the nacelles and are too high for firefighting action (Firetrace International 2023). Since burning debris from the turbine could fall on adjacent vegetation, suppression efforts would need to prioritize vegetation removal of the surrounding fuels. Responding to a BESS fire would also be difficult because specialized tactics and large amounts of water are needed and because there are increased safety risks (e.g., electrocution, toxic gases) associated with suppressing these types of fires.

Modeled fire behavior in the siting corridors also demonstrates fast rate of spread and tall flame lengths. Effective wildfire suppression for this more extreme fire behavior typically requires aerial support. Aerial suppression resources for the BLM Twin Falls District are provided through a joint aviation program with the Sawtooth National Forest. FAA regulations do not limit the proximity of aircraft to turbines for fire suppression. Aerial fire suppression could occur near project infrastructure at the pilot’s discretion. Pilots would assess situation-specific risk when flying fire suppression aircraft. This analysis assumes there would be a drastic reduction in aerial suppression efficiency in the analysis area. Drop heights for aerial wildfire suppression typically occur no more than 400 feet above the fuel canopy, with the most effective drop heights occurring less than 200 feet above the fuel canopy (National Wildfire Coordinating Group 2011). The project would result in 400 turbines that vary between 390 and 740 feet in height. The turbines could prevent or reduce the effectiveness of aerial suppression tactics. Furthermore, the aerial suppression that does occur may take longer because flight paths may need to be broken up or require more turns. MVE would file with the FAA the required FAA Obstruction Evaluation/Airport Airspace Analysis as early as possible to identify any air safety measures that would be required (applicant-committed measure 26)

Fire protection and prevention measures implemented before and during project construction, operation, and decommissioning would reduce the risk of a project-related fire. Should a fire occur, applicant-committed measures 50, 51, 57, and 59 through 64 would reduce the risk of a fire that could not be controlled or addressed through worker response or fire response providers. These measures would also reduce the potential for the project to contribute to wildfire risks (see SWCA 2022).

Project range improvements, such as added water lines and troughs (see Appendix S of MVE [2023]), would provide additional water access points for fire suppression activities. The increase in water availability from range improvement projects could increase fire suppression abilities.

Vegetation

Alternative B would disturb 9,114 acres for work areas and infrastructure areas (Table 3.7-2), which would change vegetation types, fuel types, or fuel loading. This would result in increased fragmentation of the fuels across the landscape, which could moderate spread of wildfire near the siting corridors under favorable conditions. However, the increased construction and infrastructure presence could increase the risk of wildfire ignition, especially in GS2 fuels. Approximately 7,157 acres of project ground disturbance would occur in GS2 fuels.

As described in Section 3.15.1 (Native Upland Vegetation Communities), MVE would reclaim disturbed areas to establish vegetation communities that are comparable to the vegetation community in adjacent undisturbed areas. MVE would conduct up to 5 years of reclamation monitoring (applicant-committed measure 163) that would include qualitative and quantitative (line-point intercept transects, etc.) assessments of the cover and diversity of vegetation present after reclamation.

Invasive Plant Species and Impact to Fire Regime

Project ground disturbance could increase the likelihood of introduction and spread of nonnative invasive plant species. Invasive annual grasses (such as cheatgrass, which is relatively abundant in and around the siting corridors) can increase fire frequency, increase fire spread, and change the seasonality of fire occurrence, resulting in risk to project infrastructure and spread to adjacent lands and communities even outside peak fire season. The abundance of pre-existing invasive plant populations in the area could also be further exacerbated by project ground disturbance, which could help spread invasive plant species. Additionally, new nonnative invasive plant species may be introduced from vehicles and fill material. Vegetation reclamation would implement active management and monitoring until vegetation cover re-establishes to desirable conditions consistent with BLM management standards (in accordance with MVE's Reclamation Plan [see Appendix E of MVE [2023]). Failure to do so could result in interim reclamation areas having greater fuel continuity than before construction. Work areas could be disturbed for maintenance at any time during the project. Applicant-committed measures to prevent the introduction and spread of nonnative plants (and thus the resulting abundance of fine hazardous fuels) during construction (measures 100 to 112) and to minimize ground disturbance (measures 1 and 4) would be implemented, as described in EIS Appendix 4 and in AIB-41 in EIS Appendix 3.

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Table 3.7-2. Summary of Impacts to Fire and Fuels Management by Action Alternative

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of changes to vegetation types, fuel types, or fuel loading (work areas and infrastructure areas)	9,114 acres Most fragmentation of fuels, which could slow wildfire spread in the siting corridors* 7,157 acres of GS2 fuels in the siting corridors Most potential for nonnative invasive plants, which alter fire regimes	6,953 acres Second-most fragmentation of fuels, which could slow wildfire spread in the siting corridors* 4,258 acres of GS2 fuels in the siting corridors Second-highest potential for nonnative invasive plants, which alter fire regimes	4,838 acres Second-lowest fragmentation of fuels, which could facilitate wildfire spread around the siting corridors* 4,299 acres of GS2 fuels in the siting corridors Second-lowest potential for nonnative invasive plants, which alter fire regimes	5,136 acres Third-lowest fragmentation of fuels, which could facilitate wildfire spread around the siting corridors* 2,434 acres of GS2 fuels in the siting corridors Third-lowest potential for nonnative invasive plants, which alter fire regimes	4,492 acres The lowest fragmentation of fuels, which could facilitate wildfire spread around the siting corridors* 2,244 acres of GS2 fuels in the siting corridors Lowest potential for nonnative invasive plants, which alter fire regimes
Ignition potential as a result of project infrastructure (access roads, turbines, BESS, and transmission lines)	Highest likelihood of fire ignition (because largest work area and road network)	Second-highest likelihood of fire ignition (because second-largest work area and road network)	Second-lowest likelihood of fire ignition (because smallest work area and road network)	Third-lowest likelihood of fire ignition (because smaller work area and road network)	Lowest likelihood of fire ignition (because smallest work area and road network)
Changes in the need or method of emergency response Changes to ground access routes and emergency response time	Most accessibility for on-ground fire responders (because more roads)† During construction and decommissioning, least walk-in accessibility for off- road areas (because more fencing likely required)	Second-most accessibility for on-ground fire responders (because more roads)† During construction and decommissioning, second-least walk-in accessibility for off-road areas (because more fencing likely required)	Second-least accessibility for on-ground fire responders (because fewer roads)† During construction and decommissioning, third-most walk-in accessibility for off-road areas (because less fencing likely required)	Third-least accessibility for on-ground fire responders (because fewer roads)† During construction and decommissioning, second-most walk-in accessibility for off-road areas (because less fencing likely required)	Least accessibility for on-ground fire responders (because fewer roads)† During construction and decommissioning, most walk-in accessibility for off-road areas (because less fencing likely required)
Changes to navigable airspace	Most impacted due to the largest project footprint	Second-most impacted due to a larger project footprint	Second-least impacted due to a smaller project footprint	Third-least impacted due to the smallest project footprint	Least impacted due to the smallest project footprint
Changes to availability of water for fire suppression	Range improvements could provide additional water access points for suppression activities‡	Same as Alternative B‡	Least availability of water access points for fire suppression‡	Same as Alternative D‡	Same as Alternative D‡
Changes to the BLM's integrated program of work (IPOW)	The project would limit the application and effectiveness of fuels reduction and habitat restoration projects that are part of the IPOW.	Impacts on IPOW treatments would be similar to Alternative B with Additional Measures.	Same as Alternative C	Same as Alternative C	Same as Alternative C

* Project infrastructure is not meant to serve as a fuel break. Effective fuels breaks are designed to impede the spread of wildfire or modify fire behavior by taking landscape and fuel characteristics into account. Project infrastructure may not function as an effective fuel break in all circumstances.

† Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

‡ Not all range improvements are compatible with fire suppression activities. For example, although there may be increased water sources, cattle fencing and associated structures may impede ground and aerial access to the stored water.

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Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for wildfire ignition, spread, response, and suppression are summarized in Table 3.7-3 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.7-3. Mitigation for Wildfire Ignition, Spread, Response, and Suppression

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
26	D	a
29	GG	vv–xx
49	–	nnn–ppp
50–64	–	kkkk
66–77	–	–
82	–	–
85	–	–
100–112	–	–
163	–	–

Note: All measures are detailed in EIS Appendix 4.

The application of these additional measures would mitigate the potential for equipment and operation-related ignitions and therefore mitigate the frequency of fires related to project activities.

3.7.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would have similar effects on wildfire ignition, spread, response, and suppression as Alternative B with Additional Measures (see Table 3.7-2); however, the lack of western and northern siting corridors would result in some differences. First, the decreased footprint would result in a lower likelihood of construction- and maintenance-related ignitions compared to Alternative B. The siting corridors (and their associated construction and infrastructure) could function as fuel breaks on the landscape, though as described above, fuel breaks are typically several hundred feet wide and have to be designed strategically to be most effective. Therefore, the reduction of siting corridors could result in less fragmentation of fuels, which could increase fuel continuity. Because of the reduced siting corridor footprint, there would be more areas that would remain unchanged from the existing fire regime and rate of spread compared to Alternative B. Furthermore, the smaller ground disturbance footprint could provide less accessibility to on-ground fire responders than Alternative B, potentially reducing the effectiveness of fire response and suppression efforts[4]. However, Alternative C would have more aerial fire response capability in the western and northern portions, potentially offsetting the reduction in on-ground response. Alternative C would also remove siting corridors with large amounts of GS2 fuels (4,285 acres for Alternative C compared to 7,157 acres for Alternative B). GS2 fuels yield more intense fire conditions,

[4] Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

such as higher fireline intensity and higher flame lengths, than the predominate GR3 (continuous, coarse, humid-climate grass) fuels. Considering the heightened ignition probability within the siting corridors, Alternative C would have a lower probability of starting fires in this fuel type than Alternative B. Finally, the lack of the western and northern siting corridors would result in a smaller amount of ground disturbance, which would decrease the potential for the spread and establishment of invasive annual plants, such as cheatgrass. Infested areas create a more receptive fuel bed to wildfire ignitions and are therefore more likely to transmit fire and have a greater rate of spread than non-infested areas. Compared to Alternative B, Alternative C would have a lower risk of wildfire ignition, a potentially higher potential for wildfire spread, reduced on-the-ground wildfire response capacity, increased aerial wildfire suppression efficiency, a reduced chance of ignition within GS2 fuels, and a lower risk of impacts from invasive plants on wildfire risk and spread.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize potential impacts to human-caused or natural-caused wildfire ignition and spread and wildfire suppression and response efforts in the analysis area.

3.7.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would have similar effects on wildfire ignition, spread, response, and suppression as Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. Alternative D would have the fewest siting corridors and thus the lowest risk of human-caused wildfire ignition. Furthermore, the reduced project footprint would result in greater fuel continuity than Alternative B and more areas that would remain unchanged from the existing fire regime and rate of spread. Alternative D siting corridors would contain the second-fewest GS2 fuels of the action alternatives, and therefore would have a lower wildfire ignition probability. Finally, the reduced ground disturbance footprint would decrease the potential for the spread and establishment of invasive plants species (which are more likely to transmit and spread fire). Compared to Alternative B, Alternative D would have a lower risk of wildfire ignition, a potentially higher likelihood for wildfire spread, a reduced wildfire ground response capacity,[5] an increased aerial wildfire suppression efficiency, and a lower risk of impacts from invasive plants on wildfire risk and spread.

Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize potential impacts to human-caused or natural-caused wildfire ignition and spread and wildfire suppression and response efforts in the analysis area.

3.7.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would have similar effects on wildfire ignition, spread, response, and suppression as Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. Alternative E would have the second-fewest siting corridors and the second-lowest risk of human-caused wildfire ignition. Furthermore, the reduced project footprint would result in greater fuel continuity than Alternative B, and more areas that would remain unchanged from the existing fire regime and rate of spread. Alternative E siting corridors would contain the fewest GS2 fuels of the action alternatives, and therefore would have the lowest wildfire ignition probability. Finally, the reduced ground-disturbance footprint would decrease the potential for spread and establishment of invasive plants (which are more likely to transmit and spread fire). Overall, compared to Alternative B, Alternative E would have a lower

[5] Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

risk of wildfire ignition, a potentially higher potential for wildfire spread, a reduced wildfire ground response capacity,[6] an increased aerial wildfire suppression efficiency, and a lower risk from impacts of invasive plants.

Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize potential impacts to human-caused or natural-caused wildfire ignition and spread and wildfire suppression and response efforts in the analysis area.

3.7.1.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would have similar effects on wildfire ignition, spread, response, and suppression as Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. The Preferred Alternative would have the fewest siting corridors and the lowest risk of human-caused wildfire ignition. Furthermore, the reduced project footprint would result in greater fuel continuity than Alternative B, and more areas that would remain unchanged from the existing fire regime and rate of spread. The Preferred Alternative siting corridors would contain the fewest GS2 fuels of the action alternatives, and therefore would have the lowest wildfire ignition probability. Finally, the reduced ground-disturbance footprint would decrease the potential for spread and establishment of invasive plants (which are more likely to transmit and spread fire). Overall, compared to Alternative B, the Preferred Alternative would have a lower risk of wildfire ignition, a potentially higher potential for wildfire spread, a reduced wildfire ground response capacity,[7] an increased aerial wildfire suppression efficiency, and a lower risk from impacts of invasive plants.

The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize potential impacts to human-caused or natural-caused wildfire ignition and spread and wildfire suppression and response efforts in the analysis area.

3.7.1.2.7 CUMULATIVE IMPACTS

The project in combination with existing and future trends and actions would contribute to increased impacts to fuels and fire management. The potential for increased human wildfire ignitions resulting from project activities (e.g., construction and associated project infrastructure, roads, transmission lines, and wind turbines) and from existing and future trends and actions may increase the need for local, state, and federal fire response resources, particularly during peak fire season. However, the project in combination with other increased road development associated with existing and future trends and actions could increase on-the-ground emergency response access and suppression options to fire managers. Aerial wildfire suppression efficiencies, however, would be diminished in the siting corridors. The addition of new roads and areas cleared of vegetation provide anchor points for firefighters during suppression activities. These areas would also decrease fuel continuity; however, their ability to function as fuel breaks remains uncertain. Any capacity for these areas to impede wildfire spread during strong wind events is likely negligible. Under favorable weather conditions, these areas could lessen fire behavior and allow for direct attack methods. The project in combination with other existing and future trends and actions could also partially compartmentalize fuels, which could reduce fire spread.

[6] Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

[7] Road infrastructure may or may not improve fire response capability depending on ease of accessibility to fire responders (e.g., locked gates or fences).

Alternative C in combination with existing and future trends and actions would contribute to similar impacts to fuels and fire management as described above under Alternative B. Because of the lack of corridors in the western portion of the project, the magnitude of impacts from the project would be reduced relative to Alternative B.

Alternative D in combination with existing and future trends and actions would contribute to similar impacts to fuels and fire management as described above under Alternative B. Because of the reduced presence of corridors in the western, eastern, and northern portion of the project, the magnitude of impacts from the project would be reduced relative to Alternative B and C.

Alternative E in combination with existing and future trends and actions would contribute to similar impacts to fuels and fire management as Alternative B. Because of the removal of corridors in the southern portion of the project, the magnitude of impacts from the project would be reduced relative to Alternatives B and C, and slightly higher relative to Alternative D.

The Preferred Alternative in combination with existing and future trends and actions would contribute to similar impacts to fuels and fire management as Alternative B. Because of the removal of corridors in the southern portion of the project, the magnitude of impacts from the project would be reduced relative to Alternatives B and C and slightly lower relative to Alternative D. Because of the similar but smaller footprint. The magnitude of impacts from the project would be similar but reduced relative to Alternative E.

3.7.1.3 Significance Determination

Under all action alternatives, the potential adverse effects on wildfire ignition, spread, response, and suppression are not expected to be significant. Although the alternatives would introduce additional infrastructure and human activity into the analysis area, potentially increasing the risk of human-caused fires, all action alternatives include measures aimed at reducing the potential for fire ignitions and ensuring prompt suppression of any fires that may occur as a result of construction or operation activities (Table 3.7-3). These measures include adherence to requirements in safety codes, regular inspections and maintenance, and the use of real-time monitoring systems to promptly control or shut down equipment in case of an emergency.

The response capabilities of suppression forces would be changed, with both reduced aerial suppression efficiency and improved ground response via the expanded project road network. Additionally, the project may bolster ground-based fire and fuels management efforts. For example, the fragmentation of vegetation communities resulting from the project could decrease the spread of wildfires, particularly under favorable weather conditions. This fragmentation may also create opportunities for the implementation of effective ground-based fire suppression.

Overall, while the project may introduce some new risks related to wildfire, the proposed measures and enhancements in response capabilities are expected to effectively mitigate these risks and ensure that the impact on wildfire ignition, spread, response, and suppression would not be significant.

3.7.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The project would have irretrievable long-term effects on fire and fuels management from increased wildfire ignition potential, reduced aerial wildfire suppression efficiency, and (despite their existing widespread establishment in the analysis area) increased likelihood of introduction and spread of nonnative invasive plants. Under all action alternatives, there would be adverse effects during the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. These irretrievable effects on wildfire ignition would be avoided and minimized through the implementation of mitigation measures (see Table 3.7-3 and EIS Appendix 4) until decommissioning is complete and project ignition sources are removed. Long-term irretrievable effects would also occur from increased likelihood of introduction and spread of nonnative invasive plants, which alters fire regimes; however, vegetation reclamation would implement active management and monitoring until vegetation cover re-establishes to desirable conditions. Much of the effects on fire and fuels would be reduced following decommissioning and reclamation of the project. An irreversible effect could occur where permanent disturbances result in an increased likelihood of reestablishing or spreading nonnative invasive plants (see Section 3.13.1.3).

3.7.2 Fuels Reduction and Habitat Restoration Projects

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.7-4.

Table 3.7-4. Analysis Approach for Fuels Reduction and Habitat Restoration Projects

Issue Analyzed in Detail	How would project construction and operation affect the fuels reduction aspect of habitat restoration projects that have been carried out in the area and identified in the BLM's IPOW?
Analysis Area	Same as described for wildfire ignition, spread, response, and suppression (see Section 3.7.1).
Indicators	Acres of BLM public land, state land, and private land affected. Acres of authorized ROWs and designated utility corridors affected. Potential for conflicts with existing and reasonably foreseeable land use authorizations. Conformance with applicable local, state, or federal land use designations and management plans.
Impacts Duration	Same as wildfire ignition, spread, response, and suppression (see Section 3.7.1).
Data Sources	Same as wildfire ignition, spread, response, and suppression (see Section 3.7.1).

3.7.2.1 Affected Environment

Section 3.7.1.1 (Affected Environment) provides a description of the affected environment in the fire and fuels management analysis area.

Extensive vegetation treatments (fuel reduction treatments and post-fire treatments) have occurred across the analysis area and siting corridors as part of the BLM's IPOW (see Figures 3.7-1 and 3.7-2). Most of these treatments have focused on post-fire seeding, mostly in sagebrush steppe vegetation that has been previously impacted by wildfire or other similar disturbance. Other treatments included 1) chemical treatments in shrublands and grasslands; 2) mechanical treatments in shrublands, sagebrush steppe, and grasslands; and 3) prescribed fire in shrublands and grasslands. The dominant vegetation types that have experienced these treatments are modeled as grass and GS2 fuels based on how they would typically burn. These grass and GS2 fuels represent the vegetation communities in the analysis area (SWCA 2022).

3.7.2.1.1 EXISTING AND FUTURE TRENDS AND ACTION

Existing and future trends and actions in the analysis area that affect fire and fuel management resources are described in Section 3.7.1.1 (Affected Environment). Collectively, these trends and actions have and would continue to impact the fuels reduction aspect of habitat restoration activities by altering fuel continuity, fuel volume, and arrangement as a result of vegetation disturbance and by creating impacts to the presence of nonnative species due to disturbance-related infestations, which may alter natural fire regime, and due to increased fire ignitions that would further impede habitat restoration efforts.

3.7.2.2 Impacts

3.7.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and fuels reduction and habitat restoration projects would only be affected by existing and future trends and actions.

3.7.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Project construction would clear 9,114 acres of existing vegetation (see Table 3.7-2); 74% of this (i.e., all work areas) would receive interim reclamation before final decommissioning and reclamation. Any of these work areas may be re-disturbed for maintenance during the 30-year project operation. Infrastructure would remove 2,374 acres of vegetation for 34 years (through decommissioning), which would decrease vegetation cover in the siting corridors. Vegetation removal, installation of infrastructure, and creation of roads and other areas of ground disturbance would fragment vegetation communities and reduce fuel continuity, which could impede wildfire spread, particularly in the short term (1–6 years postconstruction or post-disturbance). Vegetation management and reclamation in these areas would be conducted in a manner that controls invasive plant and noxious weed populations. If invasive plants, such as annual grasses, become prevalent in the interim reclamation areas, fine fuel loading could vary considerably from year to year, resulting in potentially higher fuel continuity than the preconstruction conditions several years after the disturbance. Alternative B would increase anthropogenic incursions, potentially increasing the frequency and volume of human-caused ignitions and therefore increasing the number of fire responses required to the area.

Integrated program of work (IPOW) projects are typically designed to reduce fragmentation and focus on large landscape-level actions, often using aerial application of herbicide to reduce invasive annual species in established perennial grass or shrub communities. The presence of turbines in the siting corridors would increase fragmentation and likely reduce the use of aerial chemical application, therefore limiting the application and effectiveness of large-scale IPOW treatments. Though aerial chemical application could occur near project infrastructure at the pilot’s discretion, this analysis assumes less of it would occur and it would take longer to be applied. Since some plants have a narrow application window for herbicides due to the need to target a specific growth stage, temperature, or moisture, the project may delay a critical application of a plant protection product and affect plant productivity. Furthermore, project construction would likely negate previous IPOW efforts because it would lead to increased fragmentation of the landscape. Additionally, the increased disturbance would likely lead to the reestablishment and expansion of invasive plant and weed populations that were previously extirpated or reduced by IPOW treatments. Where the siting corridors intersect existing IPOW treatments (see Figures 3.7-1 and 3.7-2), project restoration activities would be aligned with the objectives and monitoring protocols established for those IPOW actions, where feasible. These activities would focus on restoration of sagebrush communities, protection and restoration of habitat, management of invasive plant species, and hazardous fuels reduction. The following applicant-committed measures would be implemented by MVE during construction to reduce potential impacts to fuels reduction and habitat restoration projects in the analysis area (see EIS Appendix 4): 100 through 107. These measures would reduce but not eliminate potential impacts to fuels reduction and habitat restoration projects by limiting the abundance of fine hazardous fuels that result from invasive plants and weeds.

To minimize the impact of project activities on areas treated as part of the IPOW, other applicant-committed measures (1, 3, 4, 8, 17, 29, 37, 100–107, and 161–164) and mitigation measures required by BLM policy (D, E, J, L, P, and Q) would be applied to address reclamation, to reduce habitat fragmentation, and to mitigate potential invasive plants and weeds introduction and spread. These measures are described in EIS Appendix 4. Impacts to habitat connectivity from the project are addressed in Section 3.18.1 (Wildlife Movement [non-game mammals and reptiles]).

Alternative B with Additional Measures

Additional project-specific mitigation measures for fuels reduction and habitat restoration projects are summarized in Table 3.7-5 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.7-5. Mitigation for Fuels Reduction and Habitat Restoration Projects

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	D	a
3–4	E	vv–xx
8	J	nnn–ppp
17	L	kkkk
29	P	–
37	Q	–
100–107	–	–
161–164	–	–

Note: All measures are detailed in EIS Appendix 4.

The application of these additional measures would further address reclamation, reduce habitat fragmentation, and mitigate the potential introduction and spread or invasive plants and weeds.

3.7.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The impacts of Alternative C on fuels reduction and habitat restoration projects are similar to Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. Alternative C would clear 6,953 acres of existing vegetation; 74% of this (i.e., all work areas) would receive interim reclamation before final decommissioning and reclamation, though these areas could be re-disturbed during the 30-year project operation. When compared to Alternative B, the smaller reduction of vegetation cover (i.e., fuels) for Alternative C would result in less landscape fragmentation and an increase in fuel continuity, potentially increasing the risk of wildfire spread. However, Alternative C would have fewer anthropogenic incursions, which would likely decrease the frequency and volume of human-caused ignitions. Therefore, Alternative C would likely have less need for fire response than Alternative B.

Alternative C impacts on IPOW treatments would be similar to Alternative B with Additional Measures. Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly avoid and minimize the impact of project activities on areas treated as part of the IPOW.

3.7.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The impacts of Alternative D on fuels reduction and habitat restoration projects are similar to Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. Alternative D would clear 4,838 acres of existing vegetation; 76% of this (i.e., all work areas) would receive interim reclamation before final decommissioning and reclamation, though these areas could be re-disturbed during the 30-year operation phase of the project. When compared to Alternative B, the smaller reduction of vegetation cover for Alternative D would result in a less fragmented landscape with a higher degree of fuel continuity, potentially increasing the risk of wildfire spread. However, Alternative D would have fewer anthropogenic incursions, which would likely decrease the frequency and volume of human-caused ignitions. Therefore, Alternative D would likely have less need for fire response than Alternative B.

Alternative D impacts on IPOW treatments would be similar to Alternative B. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly avoid and minimize the impact of project activities on areas treated as part of the IPOW.

3.7.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The impacts of Alternative E on fuels reduction and habitat restoration projects are similar to Alternative B with Additional Measures (see Table 3.7-2) with the following exceptions. Alternative E would clear 5,136 acres of existing vegetation; 73% of this (i.e., all work areas) would receive interim reclamation before final decommissioning and reclamation, though these areas could be re-disturbed during the 30-year operation phase of the project. When compared to Alternative B, the smaller reduction of vegetation cover (i.e., fuel cover) for Alternative E would result in a far less fragmented landscape with a higher degree of fuel continuity, potentially increasing the risk of wildfire spread. However, Alternative E would have fewer anthropogenic incursions, which would likely decrease the frequency and volume of human-caused ignitions. Therefore, Alternative E would likely have less need for fire response than Alternative B.

Alternative E impacts on IPOW treatments would be similar to Alternative B. The less acres of siting corridors would result in fewer IPOW treatments being impacted. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly avoid and minimize the impact of project activities on areas treated as part of the IPOW.

3.7.2.2.6 PREFERRED ALTERNATIVE

The impacts of the Preferred Alternative on fuels reduction and habitat restoration projects are similar to Alternative B with Additional Measures with the following exceptions. The Preferred Alternative would clear 4,492 acres of existing vegetation; 78% of this (i.e., all work areas) would receive interim reclamation before final decommissioning and reclamation, though these areas could be re-disturbed during the 30-year operation phase of the project. When compared to Alternative B, the smaller reduction of vegetation cover (i.e., fuel cover) for the Preferred Alternative would result in a far less fragmented landscape with a higher degree of fuel continuity, potentially increasing the risk of wildfire spread. However, the Preferred Alternative would have fewer anthropogenic incursions, which would likely decrease the frequency and volume of human-caused ignitions. Therefore, the Preferred Alternative would likely have less need for fire response than Alternative B.

The Preferred Alternative impacts on IPOW treatments would be similar to Alternative B with Additional Measures. The less acres of siting corridors would result in fewer IPOW treatments being impacted. The

Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly avoid and minimize the impact of project activities on areas treated as part of the IPOW.

3.7.2.2.7 CUMULATIVE IMPACTS

The project in combination with existing and future trends and actions would contribute to increased impacts to the fuels-reduction aspect of habitat restoration projects that have been carried out in the area and identified in the BLM's IPOW. The impacts would be similar to those described in Section 3.7.2.2 (Impacts) with the greatest cumulative impacts to IPOW projects and other habitat restoration activities resulting from projects that create additional disturbance to vegetation and fuels, including livestock grazing, linear transportation projects, increased motorized access, electrical infrastructure projects, wind and solar development, and expansion of any existing ROW authorizations.

3.7.2.3 Significance Determination

To avoid project infrastructure, fuels reduction and habitat restoration projects would require more time and effort during the life of the project. Under all action alternatives, potential adverse effects would not be significant because there would be pre-project planning for fuels reduction and habitat restoration projects to account for and design avoidance of Lava Ridge Wind infrastructure.

3.7.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

To avoid project infrastructure, fuels reduction and habitat restoration projects would require more time and effort during the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. These irretrievable effects would no longer occur following decommissioning and final reclamation of the project.

3.8 LAND USE AND REALTY

3.8.1 Land Use Authorizations

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.8-1.

Table 3.8-1. Analysis Approach for Land Use Authorizations

Issue Analyzed in Detail	How would construction and operation of the project affect existing and reasonably foreseeable land use authorizations (i.e., authorized land uses and ROWs, communication sites, or FAA/aviation uses)? Would the project result in the permanent conversion of existing land uses?
Associated Issues Analyzed in Brief	AIB-11: How would the project impact emergency responders that serve the project vicinity? AIB-16: How would the project affect the functionality of range improvements during the allotment grazing period? AIB-17: Would construction of the project limit or restrict access to locatable minerals in and around the project? AIB-18: Would the project limit or restrict access to saleable minerals (materials such as gravel and rock quarries, for example) available from BLM public lands in and around the project? AIB-19: Would construction of the project limit or restrict access to leasable minerals in and around the project? AIB-34: How would the project affect prime and unique farmland or productive soils in the vicinity of the project and how many acres would be affected?
Analysis Area	The analysis area for land use and realty differs between the types of land use authorization being analyzed, as follows: • The analysis area discussed for land use designations, authorized land uses and ROWs, and designated utility corridors comprises the Alternative B (Proposed Action) siting corridors. • The analysis area discussed for communication sites comprises the Alternative B siting corridors and a 10-mile buffer. These analysis areas have been determined based on the existing type of land use authorization that would be impacted by the project. The Alternative B siting corridors are used to define the analysis areas above because they are the most expansive siting corridors of the action alternatives and are inclusive of the siting corridors for Alternative C (Reduced Western Corridors), Alternative D (Centralized Corridors), Alternative E (Reduced Southern Corridors), and the Preferred Alternative, except for the expanded footprint around the Midpoint Substation for Alternatives C through E and the Preferred Alternative. Any differences between the action alternatives' siting corridors are presented in the summary of impacts.
Indicators	Acres of BLM public land, state land, and private land affected. Acres of authorized ROWs and designated utility corridors affected. Potential for conflicts with existing and reasonably foreseeable land use authorizations. Conformance with applicable local, state, or federal land use designations and management plans.
Impacts Duration	The impacts duration for all types of land use authorizations would be the life of the project (time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	BLM Case Recordation System. Coordination with the Federal Communications Commission (FCC) and land and emergency services data derived from the FCC's Universal Licensing System and the FCC's Public Safety and Homeland Security Bureau. MVE's Wind Power GeoPlanner Land Mobile & Emergency Services Report (Comsearch 2020). Vegetation cover data (NLCD) (Xian et al. 2015). Applicable land use management plans, including BLM (1986), as amended, and county land use plans.

3.8.1.1 Affected Environment

3.8.1.1.1 LAND USE DESIGNATIONS

The siting corridors are located approximately 25 miles northeast of Twin Falls, Idaho, in the area managed for the BLM SFO. The siting corridors cover approximately 84,051 acres in Lincoln (36,658 acres), Jerome (42,864 acres), and Minidoka Counties (4,530 acres), Idaho. Most of the siting corridors are on BLM public lands (75,431 acres), with smaller portions on state (2,916 acres), BOR (288 acres), and private land (5,417 acres). Landownership of the siting corridors is shown in EIS Figures 2.4-1 and 2.4-2. BLM public lands in the analysis area are managed in accordance with BLM (1986), as amended, which establishes the goals and objectives for the management of resources.

BLM SFO's Monument Resource Management Plan

As stated in EIS Appendix 2, the siting corridors would be in an area designated as moderate use in BLM (1986), as amended, which is described as follows:

> Moderate use areas are generally suitable for a wide range of existing and potential uses and will be managed for production and use of their forage, timber, minerals and energy, recreation, or other values. Where conflicts occur with resources or uses, full consideration of all benefits and costs will be taken into account in resolving such conflicts. Sensitive and significant values will always be protected consistent with Federal and State law. Public lands in a moderate use area will be retained in Federal ownership. (BLM 1986:4)

Areas of Critical Environmental Concern

None of the ACECs within 30 miles of the siting corridors were designated for visual values.

During public review of the draft EIS, the BLM received a proposal for a potential ACEC associated with Minidoka WRC. The ACEC proposal the BLM received was for a larger area referred to as the "Greater Minidoka" area. The BLM conducts ACEC review, full evaluation, and designation through land use planning processes. This project-specific NEPA review of MVE's application for the Lava Ridge Wind Project is not associated with the development or revision of a land use plan. In accordance with the BLM ACEC manual (BLM 1988), the BLM has conducted preliminary evaluations of two potential ACECs (the Minidoka WRC boundary and also the proposed Greater Minidoka area; see EIS Appendix 13 for these preliminary evaluations). The BLM preliminarily evaluated the two areas for relevance and importance criteria required for ACEC designation (BLM 1988) and to identify whether interim management is warranted to protect values contributing to the relevance and importance criteria. Having conducted these preliminary evaluations, the BLM will apply interim management objectives to the BLM public lands within Minidoka WRC (see EIS Figures 2.4-1 and 2.4-2); the BLM is considering Minidoka WRC as a potential ACEC. The BLM's interim management would limit project-specific vertical structures to less than 100 feet (measure hhhh), except for previously authorized and existing transmission corridors, such as the Section 368 WEC and the SWIP-North.

Four historic sites were identified on BLM public lands. The BLM determined that all four sites meet relevance criterion 1 and importance criteria 1 and 2 necessary for consideration as a potential ACEC. The four sites are a trash dump, two field clearing piles, and an irrigation lateral canal. As described in EIS Section 3.5 (Cultural Resources), Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. Future development near these four identified historic sites would be evaluated under existing legal authorities, foremost of which is the

NHPA of 1966, as amended, and the BLM would ensure that these four known sites are not adversely affected through physical impacts from future activities authorized on BLM public lands (see also EIS Appendix 13). The known historic properties associated with Minidoka WRC located on BLM public lands possess little or no intrinsic visual qualities that require special management attention for the viewsheds. Furthermore, the viewshed is not a defining characteristic that enables each of these sites to convey its historical identity and significance. Alteration of the viewshed from these specific historic properties will not diminish the integrity or significance that makes these properties eligible for the NRHP.

Although more than half of the BLM public lands within Minidoka WRC have been inventoried for cultural resources, there remain large tracts northeast and southeast of Minidoka NHS and within Minidoka WRC that have yet to be inventoried. These areas have the potential to contain additional cultural resources associated with Minidoka WRC that are currently not known. The viewshed from such resources, should they exist, will need to be evaluated on a case-by-case basis as the resources are identified in the future. Given the current unknown nature of cultural resources in these areas, the BLM would temporarily limit construction of newly authorized infrastructure over 100 feet tall on BLM public lands (the height identified in the Greater Minidoka ACEC proposal) within Minidoka WRC as a BLM interim management strategy. Such an interim strategy would be specific to the Lava Ridge Wind Project and would remain in place until the current BLM resource management plan (BLM [1986]) can be updated. Existing and previously authorized infrastructure taller than 100 feet could be located within currently authorized ROWs, and the Section 368 WEC would be exempt from this height restriction. This includes the previously authorized SWIP-North and the Gateway West transmission lines.

County Comprehensive Plans

As stated above, most of the siting corridors are on BLM public lands. In Lincoln County, approximately 75% of land area in the county is BLM public lands (Lincoln County 2008). Areas outside BLM public lands in Lincoln County near the siting corridors are zoned A-40 agricultural (Lincoln County 2020a). One of the policies in the *Lincoln County Comprehensive Plan* under County Appearance and Quality of Life Policy aims to “protect the visual character of the county through the location of cell phone towers, wind generation towers, power transformers and telephone facilities to less visible areas whenever possible” (Lincoln County 2008:28).

Per the *Jerome County Comprehensive Plan*, state and federal land accounts for more than 25% of county lands (Jerome County 2018). The BLM oversees most natural resources management activities and establishes management standards for the federal land in Jerome County, whereas the Idaho Department of Lands oversees and manages state land in Jerome County (Jerome County 2018). Planned land uses around the siting corridors are agricultural. Jerome County (2018) provides objectives for land use to preserve agricultural land uses. Jerome County (2018) states that buttes provide ideal localities for the placement of radio and other kinds of signal towers and allows signal towers on buttes free of zoning restrictions unless located in or near airport overlay zones. In addition, Jerome County (2018) states that alternative energy sources, such as wind or solar power, may be appropriate but should also require a permitting process to prevent or mitigate potential conflicts.

Minidoka County includes approximately 36% federal land and 2% state land. Agriculture is a predominant land use in Minidoka County per the *Minidoka County Comprehensive Plan* (Minidoka County 2013). The land use section of Minidoka County (2013) designates different land use categories, including high (heavy) agricultural land uses and medium (light) agricultural land use. In areas designated as high agricultural land uses, Minidoka County (2013) notes that “non-agricultural uses could have adverse impacts in the agricultural land use area and must be carefully reviewed if allowed” (Minidoka County 2013:27). Areas designated as medium (light) agricultural land use allow for other uses deemed compatible with agricultural and residential use that have minimal impact upon surrounding properties and “utility installations, including communications towers, may be allowed upon review through a special use permit process” (Minidoka County 2013:28).

3.8.1.1.2 AUTHORIZED LAND USES

The primary existing land use in the siting corridors is rangeland and is surrounded by pockets of center pivot-irrigated cropland and low-density, single-family residences associated with these agricultural uses. General developed land use types were determined using land use classifications from the USGS NLCD. Agricultural resources in the analysis area include cultivated cropland, pasture/hayland, and grazing allotments. Grazing allotments cover approximately 77,364 acres (91.7%) of the analysis area, and agricultural land uses cover approximately 3,428 acres (4.1%) of the analysis area. Agricultural lands are shown on EIS Figure 3.1-1 in EIS Section 3.1.1 (Existing and Future Trends and Actions). Additional information on grazing in the analysis area is provided in Section 3.9.1 (Grazing Allotments and Range Socioeconomics).

3.8.1.1.3 RIGHTS-OF-WAY

No designated utility corridors are identified in BLM (1986), as amended; however, utility development is prohibited in wilderness study areas recommended suitable for designation by the BLM[8] (BLM 1986:29). There are no designated or recommended suitable wilderness study areas in the siting corridors. At the time of the RMP, proposed utility developments in the analysis area closely followed existing ROW routes (BLM 1986).

Four existing 345-kV transmission lines cross the siting corridors: the Midpoint to Adelaide line, the Midpoint to Borah line, the Midpoint to Kinport line, and the Midpoint to Valmy line. These existing transmission lines all interconnect to the existing Midpoint Substation, which is approximately 12 miles west of the siting corridors near U.S. 93 in Jerome County. Midpoint Substation is one of two potential points of interconnection for the project. One other existing high-voltage transmission line, the Midpoint to Hemingway 500-kV transmission line, is approximately 0.04 mile from the siting corridors but does not directly cross the siting corridors. Additionally, the ROW for the authorized but not-yet-constructed SWIP-North 500-kV transmission line intersects the siting corridors. The second potential point of interconnection for the project would be along the SWIP-North.

The siting corridors are bisected by two 3,500-foot-wide corridors (49-112 and 112-226) included in the WEC, which is a network of designated corridors across BLM and USFS public lands in 11 western states for pipelines and electrical transmission and distribution facilities. The Midpoint to Adelaide transmission line is in WEC 49-112, and the permitted SWIP-North and the existing Midpoint to Valmy transmission line are in WEC 112-226.

Other types of BLM-authorized ROWs in the analysis area include communication sites, non-linear transportation (maintenance sheds, rest areas, scenic pull-outs, storage yards, etc.), water features and related infrastructure, linear communications and telephone lines, and other undefined ROW types.

3.8.1.1.4 COMMUNICATION SITES

Comsearch (2020) includes an inventory of existing communication sites as part of its assessment on the impact of the presence of wind turbines on communications. The assessment evaluated registered

[8] Wilderness study areas that are recommended as suitable by the BLM are managed in accordance with the Interim Wilderness Management Policy until a final designation is made by the U.S. Congress.

frequencies for the following types of first responder entities: police, fire, emergency medical services, emergency management, hospitals, public works, and transportation; other state, county, and municipal agencies; and industrial and business land mobile radio systems and commercial E911 operators. Land and emergency services data were derived from the FCC's Universal Licensing System and the FCC's Public Safety and Homeland Security Bureau to identify site-based licenses and regional area-wide licenses for public safety uses. Comsearch identified 29 site-based licenses in the immediate vicinity of the siting corridors (Table 3.8-2). Additionally, Comsearch found 405 mobile licenses defined by center point and radius that intersected the siting corridors and immediately surrounding areas. Mobile licenses that intersect the siting corridors are registered under the names of multiple different counties and local municipalities, fire and irrigation districts, schools and school districts, medical facilities, commercial and industrial companies, wireless communication providers, radio and telephone companies, electric companies and other energy providers, the State of Idaho, and individuals. Area-wide licenses in the area are designated for mobile use only and include 220-megahertz (MHz), 700-MHz, 800-MHz, and 4.9-gigahertz frequency ranges, as well as the FCC's Part 90 public safety pool frequencies authorized under 47 CFR 90.20. Eight area-wide licenses were found for the State of Idaho: two were listed for Lincoln County, two were listed for Jerome County, and four were listed for Minidoka County. Lastly, there are five mobile telephone carriers (see Table 3.8-2) that have area-wide licenses and provide 911 services in the analysis area (Comsearch 2020).

Table 3.8-2. Site-Based and Regional Licensees and Mobile Telephone Carriers near the Siting Corridors

Site-Based Licensees	Regional Area-Wide Licensees	Mobile Telephone Carriers
Lincoln County	State of Idaho	AT&T
Minidoka County	ITD	DISH network
Minidoka County Highway District	Minidoka County	Sprint
Cassia County	Minidoka County Highway District	T-Mobile
Southern Idaho Regional Communications Center	Cassia County	Verizon
A&B Irrigation District	Valley County	
West End Fire Protection District	Southern Idaho Regional Communications Center	
Idaho Power Co	American National Red Cross	
Union Pacific Railroad Company	Idaho Mountain Search and Rescue	
ALL Wireless Communications LLC	Idaho State Search and Rescue	
	National Ski Patrol System	
	City of Rupert	

Source: Comsearch (2020).

Note: In addition to the licensees listed in this table, there are 405 mobile licenses that intersect the siting corridors, which are summarized in the section that precedes this table.

Additional details concerning existing communication systems in the analysis area were identified through scoping and public comments on the draft EIS. Specific locations of tower sites and communication pathways were identified by Project Mutual Telephone (a local telephone and broadband provider) and Southern Idaho Regional Communications Center (a regional emergency dispatch center). Southern Idaho Regional Communications Center tower sites identified in the analysis area include one tower site on BLM public lands (Dietrich Butte, Lincoln County) and several other tower sites on non-BLM public land, including the Hansen tower site (Twin Falls County), Gooding tower site (Gooding

County), and Skeleton Butte tower site (Jerome County). Project Mutual Telephone identified their primary service area of concern in the analysis area to encompass residential and commercial areas around Kimama Butte (in Minidoka County). During the public comment period for the draft EIS, area residents also identified farming-related communication systems as a relevant communication use within the analysis area. Farmers in the analysis area use real-time kinematics systems, which use global positioning system (GPS) satellites and ground-based stations (e.g., towers) to enable farmers to track the locations of crops, farming equipment, etc., in real time (Farmers Weekly 2012). Additionally, farmers use automated irrigation systems, which rely on telemetry and supervisory control and data acquisition systems to monitor and manage water use efficiently (Balsom 2020). MVE's coordination with communication providers and operators is ongoing to identify specific sites and pathways of concern in the analysis area.

3.8.1.1.5 EXISTING AND FUTURE TRENDS AND ACTIONS

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 analysis area through the conversion of agricultural or rangeland for other uses, by increasing the number of existing ROWs and communication sites in the analysis area, and expansion of the communication network (see EIS Figure 3.1-1).

Existing and future trends and actions associated with electrical infrastructure development and ROWs have affected or will affect approximately 4,706 acres (5.6%) of the analysis area (see EIS Figure 3.1-1). County land use plans have implemented policies to address the conversion of agricultural and rangeland to other uses. For example, Lincoln County implemented a subdivision ordinance in September 2020 to regulate rural subdivisions in unincorporated areas of Lincoln County to manage growth by conserving existing uses, controlling future development, and protecting agricultural lands (Lincoln County 2020b). Per Jerome County (2018), telecommunication services generally coincide with major electrical transmission lines and are located on buttes managed by private entities and the Idaho Department of Lands.

3.8.1.2 Impacts

3.8.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and land use and realty would only be affected by the existing and future trends and action.

3.8.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Land Use Designations

Development in the Alternative B siting corridors would be subject to land use approvals from applicable landowners and jurisdictions, including the BLM and Lincoln, Jerome, and Minidoka Counties. Additional approvals may be required from the state of Idaho, BOR, or private landowners, depending on whether those portions of siting corridors are developed. Landownership of the siting corridors is listed in Table 3.8-3 for each of the action alternatives.

Table 3.8-3. Siting Corridors Landownership by Action Alternative in the Analysis Area

Landowner	Alternative B (acres [%])	Alternative C (acres [%])	Alternative D (acres [%])	Alternative E (acres [%])	Preferred Alternative (acres [%])
BLM	75,431 (89.7%)	58,079 (89.4%)	43,816 (90.2%)	44,626 (88.1%)	39,509 (88.3%)
BOR	288 (0.3%)	288 (0.4%)	229 (0.5%)	288 (0.6%)	201 (0.4%)
State	2,916 (3.5%)	2,318 (3.6%)	1,722 (3.5%)	1,844 (3.6%)	1,561 (3.5%)
Private	5,417 (6.4%)	4,530 (6.9%)	2,830 (5.8%)	3,923 (7.7%)	3,497 (7.8%)
Total	**84,051**	**65,215**	**48,597**	**50,680**	**44,768**

As stated in the Introduction section in EIS Appendix 2, Alternative B is in conformance with BLM (1986), as amended. The siting corridors are in an area designated for moderate use, which is suitable for a wide range of existing and potential uses (BLM 1986:4). BLM (1986), as amended, also states that "public lands may be considered for the installation of public utilities, except where expressly closed by law or regulation. Project approval would be subject to preparation of an environmental assessment or environmental impact statement. BLM will work closely with Idaho Public Utilities Commission, other State and Federal agencies, local governments, utility companies, and other interested parties to determine appropriate locations and environmental safeguards for public utilities involving public lands" (BLM 1986:29).

Turbines are proposed within 4,449 acres of Alternative B siting corridors that overlap Minidoka WRC. Under the BLM's interim management for Minidoka WRC as a potential ACEC, turbine installation in these areas would not be in conformance with the BLM's interim management to restrict project-specific vertical structures to less than 100 feet (measure hhhh). If turbine spacing would allow, MVE could shift the proposed turbines from within Minidoka WRC to other Alternative B turbine siting corridors, and Alternative B would be in conformance with the BLM's interim management.

Alternative B would require building permits from Lincoln, Jerome, and Minidoka Counties. Project compliance with applicable development standards and guidelines, as specified in the counties' zoning ordinances and comprehensive plans, would be evaluated as part of the permitting process for Lincoln, Minidoka, and Jerome Counties. Generally speaking, Alternative B would occur in agricultural zoning areas and in accordance with the counties' stated goals and objectives for agricultural areas, Alternative B would be considered compatible with the agricultural zoning districts, but may conflict with residential, recreational, or natural resource uses, which would be subject to review and further consideration through the counties' permitting processes.

Authorized Land Uses

The BLM's designation of ROWs for the siting corridors is not exclusive, and coordination and outreach with existing authorized users would be completed for the project to ensure that the project avoids impacts to existing uses. During project construction, existing land uses may be precluded from the siting corridors (84,051 acres) for temporary durations as construction shifts across the analysis area (except for emergency maintenance activities, which would be coordinated with MVE). This would be a temporary impact lasting the duration of the up-to-3-year construction phase. MVE's applicant-committed measures 41 and 42 would reduce the duration of public access restrictions to the extent practicable during construction, while also ensuring public safety (see Table App4-2e in EIS Appendix 4).

During operation, Alternative B would not physically preclude any other permitted uses (e.g., grazing and recreation) from the siting corridors, except where permanent infrastructure is sited (2,374 acres).

However, additional work areas subject to potential re-disturbance during operation and maintenance (6,740 acres) would also be unavailable for livestock grazing uses, specifically, due to lack of adequate livestock forage; see Section 3.9.1 (Grazing Allotments and Range Socioeconomics). Therefore, accounting for both infrastructure and work area disturbance, the total amount of long-term land use conversions under Alternative B would be 9,114 acres, or 10.8% of siting corridors. The acres that would be precluded from other land uses during construction and operation are listed in Table 3.8-4 for each of the action alternatives. MVE's applicant-committed measures 1, 3, 4, and 38 would minimize the amount of long-term disturbance to the extent practicable.

Table 3.8-4. Construction, Operation, and Decommissioning Land Use Impacts by Action Alternative

Land Use Impacts	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)	Alternative E (acres)	Preferred Alternative (acres)
Area subject to temporary preclusions from other land uses during construction and decommissioning	84,051	65,215	48,597	50,680	44,768
Long-term land use conversion during operation	9,114	6,953	4,838	5,136	4,492

Impacts to authorized land uses during decommissioning would be the same as those discussed for construction, except in the reverse order. Some operation-related facilities may be retained on public lands. If this occurs, those areas would not be reclaimed, and permanent land use impacts of other uses being precluded would persist. Decommissioning would involve reclamation and would follow site restoration and postconstruction restoration plans to minimize long-term impacts to land use.

Per 43 CFR 2807.14, a preliminary notification of the project was sent to authorization holders in the siting corridors on July 2, 2020. Other than scoping comments received from Project Mutual Telephone and Southern Idaho Regional Communications Center, no responses have been received from authorization holders. The BLM would continue to work with existing authorization holders and future land use requests to resolve potential conflicts (applicant-committed measures 40 and 42).

Rights-of-Way

The siting corridors would overlap 143.0 acres of designated ROW corridors (Table 3.8-5). Infrastructure would be sited to avoid impacting existing ROW corridors. During construction, the siting corridors would be unavailable for new ROW authorizations from the BLM. During operation, the ROW would be non-exclusive, and any new applications for ROWs in the siting corridors would be analyzed for compatibility with the project infrastructure on a case-by-case basis. Per regulation (43 CFR 2807.12), MVE would be liable to third-party existing ROW holders for any damage or injury it causes to other users' facilities or rights. Per MVE's applicant-committed measure 40 (see Table App4-2e in EIS Appendix 4), MVE would coordinate road construction and use among existing ROW holders. Impacts to existing ROWs during decommissioning would be the same as those under construction, except in the reverse order. After decommissioning, other ROW uses would be able to resume. The acreage of existing ROW corridors intersected by the siting corridors is listed in Table 3.8-5 for each of the action alternatives.

Table 3.8-5. Existing Bureau of Land Management–Authorized Rights-of-Way in the Analysis Area

ROW Type	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)	Alternative E (acres)	Preferred Alternative (acres)
Communication site	0.01	0.01	0	0.01	0.01
Non-linear transportation	24.2	19.8	0	19.8	19.8
Water feature/infrastructure	5.5	3.3	0.6	3.2	1.1
Linear communication/ telephone	32.7	27.2	24.0	17.4	17.2
Other/undefined	80.6	46.2	35.6	45.8	45.8
Total	**143.0**	**96.4**	**60.2**	**86.2**	**83.9**

Source: BLM (2020).

Communication Sites

Comsearch (2020) assessed the impact of wind turbines on communication sites. Results of this assessment indicate that the impact of wind turbines on communication services is consistently low, despite variations amongst different services in terms of frequency ranges and the type of services provided (including voice, video, and data applications). Each network is designed to operate reliably in a non–line-of-sight environment, and many land mobile systems are designed with multiple base transmitter stations that cover a large geographic area with overlap between adjacent transmitter sites to provide handoff between calls. Therefore, any signal block that may be caused by wind turbines would not materially degrade the reception because the end user would likely receive signals from multiple transmitter locations. In addition, the frequency of the operation for these services would allow the signal to propagate through the wind turbines. Comsearch (2020) recommended not locating any turbines within 254 feet of land mobile fixed-base stations to avoid potential impacts to the communications services provided by these stations. This setback distance is based on FCC interference emissions from electrical devices in the land mobile frequency bands. With implementation of these setbacks, it is assumed that interference with any farming-related communication systems would also be minimized. However, interference with farming-related communication systems may still occur depending on proximity of wind turbines to other components of farming-related communication systems such as real-time kinematics stations and supervisory control and data acquisition sensors. Comsearch (2020) stated that many options exist for stations to improve their signal coverage during project operation through improvements to nearby base stations or additions of repeater sites.

Communications equipment associated with the project could include mobile radio repeaters, cellular stations, and fiber-optic connections. If any such equipment is used, it would be licensed with appropriate regulatory agencies and removed upon construction completion.

Per MVE’s applicant-committed measures 27 and 28, MVE would design the project to minimize interference with communication systems (including registered systems identified by Comsearch as well as non-registered farming-related systems) and work with system users to resolve any issues; measures to reduce interference may include the use of Comsearch’s recommended setbacks from land mobile fixed-base stations (254 feet) or other design modifications such as attaching communications equipment to project infrastructure or to existing communications structures in the analysis area. Signal studies were provided in April 2021 to all communication site authorization holders who had submitted responses to the BLM following notification provided in July 2020. Before final design and siting of project infrastructure, MVE would complete a line-of-sight interference study to further identify communication pathways potentially blocked by the project's proposed infrastructure and to determine where potential impacts to existing communication towers (including both FCC-registered and un-registered towers) can either be avoided through micro-siting of infrastructure or mitigated. Coordination with local communication providers and operators is considered ongoing.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for land use authorizations are summarized in Table 3.8-6 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.8-6. Mitigation for Land Use Authorizations

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	–	tt
3	–	lll
4		hhhh
27	–	–
28		–
38	–	–
40–42	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of these measures would further minimize the potential for land use conflicts between Alternative B and communication systems or FAA uses. As described for Alternative B, if turbine spacing would allow, MVE could shift the proposed turbines from within Minidoka WRC to other Alternative B turbine siting corridors, and Alternative B would be in conformance with the BLM's interim management for the potential ACEC.

3.8.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Land Use Designations

Under Alternative C, the project would require the same land use approvals and permits from the BLM and Lincoln, Jerome, and Minidoka Counties as Alternative B. However, the overall footprint of the siting corridors under Alternative C is 18,836 less acres than Alternative B, resulting in a reduced potential for land use conflicts in the western project vicinity (see Table 3.8-3). Alternative C would not be in conflict with the BLM's interim management of the potential ACEC for Minidoka WRC because the Alternative C turbine siting corridors do not overlap Minidoka WRC.

Authorized Land Uses

Under Alternative C, 18,836 less acres would be subject to temporary preclusions for other authorized uses during construction and decommissioning compared to Alternative B (see Table 3.8-4). Long-term land use conversions from infrastructure and work area disturbances would also be 2,161 less acres under Alternative C when compared to Alternative B because fewer turbines and transmission lines are proposed (see Table 3.8-4). Since the overall footprint of the siting corridors and length of access roads are reduced under Alternative C, the potential for conflicts with existing authorization holders and future land use requests would be reduced, particularly in the western portion of the project. Alternative C would implement the same applicant-committed measures as Alternative B with Additional Measures, which would similarly minimize the potential for temporary preclusions and long-term land use conversions.

Rights-of-Way

Under Alternative C, the amount of land that would be unavailable for new ROW authorizations during construction and decommissioning would be 18,836 less acres than under Alternative B (see Table 3.8-4). The siting corridors for Alternative C overlap 49.1 less acres of designated ROW corridors compared to Alternative B. This results in a reduced need for coordination among users (e.g., communication, utilities, transportation, or water-related infrastructure) and a reduced potential for incidental damage or injury to other users' facilities or rights (see Table 3.8-5). Since the overall footprint of the siting corridors is reduced under Alternative C, the potential for conflicts between project infrastructure and future ROW applicants would be reduced, particularly in the western portion of the project. Alternative C would implement the same applicant-committed measure as Alternative B with Additional Measures to coordinate road construction and use among existing ROW holders.

Communication Sites

Under Alternative C, impacts to communication sites would be the same as Alternative B. Under all action alternatives, the project would be designed to avoid interference with public safety communication systems and to minimize interference with other radar, microwave, television, and radio transmissions. Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential for communication interference.

3.8.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Land Use Designations

Impacts to land use designations under Alternative D would be the same as Alternative C, except that the overall footprint of the siting corridors under Alternative D is 16,618 less acres than Alternative C (see Table 3.8-3).

Regarding the potential ACEC for Minidoka WRC, the Alternative D turbine siting corridors would affect 2,690 less acres (60% less) of Minidoka WRC than Alternative B. Similar to Alternative B, if turbine spacing would allow, MVE could shift the proposed turbines from within Minidoka WRC to other Alternative D turbine siting corridors, and Alternative D would be in conformance with the BLM's interim management.

Authorized Land Uses

Impacts to authorized land uses under Alternative D would be the same as Alternative C, except that the acreage that would be subject to temporary preclusions during construction and decommissioning would be 16,618 less acres than Alternative C and long-term land use conversions from infrastructure and work area disturbances would also be 2,115 less acres than Alternative C (see Table 3.8-4). Compared to Alternative C, this alternative would result in a reduced potential for conflicts with existing authorization holders and future land use requests, particularly east of Hidden Valley Road. Alternative D would implement the same applicant-committed measures as Alternative B with Additional Measures, which would similarly minimize the potential for temporary preclusions and long-term land use conversions.

Rights-of-Way

Impacts to ROW authorizations under Alternative D would be the same as Alternative C, except that the amount of land that would be unavailable for new ROW authorizations during construction and decommissioning would be 16,618 less acres than under Alternative C (see Table 3.8-4), and 36.2 less acres of designated ROW corridors would be intersected by the siting corridors (see Table 3.8-5). Compared to Alternative C, this action alternative would result in reduced potential for conflicts between project infrastructure and existing or future ROW users, particularly east of Hidden Valley Road. Alternative D would implement the same applicant-committed measure as Alternative B with Additional Measures to coordinate road construction and use among existing ROW holders.

Communication Sites

Under Alternative D, impacts to communication sites would be the same as Alternative C.

3.8.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Land Use Designations

Impacts to land use designations and the potential ACEC for Minidoka WRC under Alternative E would be the same as Alternative C, except that the overall footprint of the siting corridors under Alternative E is 14,535 less acres than Alternative C (see Table 3.8-4).

Authorized Land Uses

Impacts to authorized land uses under Alternative E would be the same as Alternative C, except that the acreage that would be subject to temporary preclusions during construction and decommissioning would be 14,535 less acres than Alternative C, and long-term land use conversions from infrastructure and work area disturbances would also be 1,817 less acres than Alternative C (see Table 3.8-4). Compared to Alternative C, this alternative would result in a reduced potential for conflicts with existing authorization holders and future land use requests, particularly in the southern portion of the project. Alternative E would implement the same applicant-committed measures as Alternative B with Additional Measures, which would similarly minimize the potential for temporary preclusions and long-term land use conversions.

Rights-of-Way

Impacts to ROW authorizations under Alternative E would be the same as Alternative C, except that the amount of land that would be unavailable for new ROW authorizations during construction and decommissioning would be 14,535 acres fewer than Alternative C (see Table 3.8-4), and 10.2 less acres of designated ROW corridors would be intersected by the siting corridors (see Table 3.8-5). Compared to Alternative C, this alternative would result in reduced potential for conflicts between project infrastructure and existing or future ROW users, particularly in the southern portion of the project. Alternative E would implement the same applicant-committed measure as Alternative B with Additional Measures to coordinate road construction and use among existing ROW holders.

Communication Sites

Under Alternative E, impacts to communication sites would be the same as Alternative C.

3.8.1.2.6 PREFERRED ALTERNATIVE

Land Use Designations

Impacts to land use designations and the potential ACEC for Minidoka WRC under the Preferred Alternative would be the same as Alternative C, except that the overall footprint of the siting corridors under the Preferred Alternative is 20,447 less acres than Alternative C (see Table 3.8-4).

Authorized Land Uses

Impacts to authorized land uses under the Preferred Alternative would be the same as Alternative C, except that the acreage that would be subject to temporary preclusions during construction and decommissioning would be 20,447 less acres than Alternative C, and long-term land use conversions from infrastructure and work area disturbances would also be 2,461 less acres than Alternative C (see Table 3.8-4). Compared to Alternative C, this alternative would result in a reduced potential for conflicts with existing authorization holders and future land use requests, particularly in the southern portion of the project. The Preferred Alternative would implement the same applicant-committed measures as Alternative B with Additional Measures, which would similarly minimize the potential for temporary preclusions and long-term land use conversions.

Rights-of-way

Impacts to ROW authorizations under the Preferred Alternative would be the same as Alternative C, except that the amount of land that would be unavailable for new ROW authorizations during construction and decommissioning would be 20,447 less acres than Alternative C (see Table 3.8-4), and 12.5 less acres of designated ROW corridors would be intersected by the siting corridors (see Table 3.8-5). Compared to Alternative C, this alternative would result in reduced potential for conflicts between project infrastructure and existing or future ROW users, particularly in the southern portion of the project. The Preferred Alternative would implement the same applicant-committed measure as Alternative B with Additional Measures to coordinate road construction and use among existing ROW holders.

Communication Sites

Under the Preferred Alternative, impacts to communication sites would be the same as Alternative C.

3.8.1.2.7 CUMULATIVE IMPACTS

Existing and future trends and actions associated with population growth, electrical infrastructure development, renewable energy facilities, and ROW authorizations would continue to influence existing land use authorizations in the analysis area primarily through increasing amounts of land use conversions and conflicts with authorized land uses during construction phases. When combined with the effects of

Alternative B, the extent of future land use conversions and temporary or long-term conflicts with agricultural, rangeland, and communication uses would be further compounded.

As previously discussed for the affected environment, county land use plans have implemented policies to manage growth and address the conversion of agricultural and rangeland to other uses. Reasonably foreseeable development projects would need to comply with these local land use plans and policies, which are largely intended to maintain compatibility between neighboring land uses.

3.8.1.3 Significance Determination

Under all action alternatives, potential adverse effects to land use authorizations would not be significant. An authorization granted for the project would be non-exclusive and require developments to be compatible with existing authorized uses, and those uses would continue as authorized. Coordination and outreach with existing authorization holders would be required to ensure the project avoids impacts during construction, operation, and decommissioning periods. Project construction and decommissioning would result in temporary access restrictions for public safety, and this could result in short-term impacts to access for other authorized uses. Required coordination would ensure authorized users have access needed to maintain facilities or use public lands as authorized. The project would not preclude additional uses if they are determined to be compatible and are authorized.

3.8.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, the construction and decommissioning phases would have short-term irretrievable effects on existing land uses. During the 30-year operation, the project would include long-term irretrievable land use conversions resulting from infrastructure and work area disturbances in the analysis area. If project access roads are retained on public lands post-project, an irretrievable commitment of land uses would occur as long as the roads remain in place.

3.8.2 Aviation

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.8-7.

Table 3.8-7. Analysis Approach for Aviation

Issue Analyzed in Detail	How would construction and operation of the project affect aviation resources, including regional airports, controlled airspace, and aerial crop dusting or other aerial operations?
Associated Issues Analyzed in Brief	AIB-15: Would turbine wake pose a hazard to low-altitude flights downwind of the turbines?
Analysis Area	Alternative B siting corridors and a 15-mile buffer. This analysis area has been determined based on the aviation resources that would be impacted by the project. The Alternative B siting corridors are used to define the analysis area because they are the most expansive siting corridors of the action alternatives.
Indicators	Acres of siting corridors within controlled airspace. Potential for tall structures (greater than 200 feet above ground level) to pose hazards to air navigation. Turbine siting corridor distance to airports and landing areas and potential for changes to instrument approach procedures. Acres of agricultural and grazing lands affected.

Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation (see EIS Section 2.3.3).
Data Sources	FAA Aeronautical Study No. 2022-WTW-4666-OE (FAA 2023a). Published airspace navigational charts (SkyVector 2023).
Assumptions or Approach	The analysis considers aviation issues specific to the project and regional aviation resources. Aviation siting concerns for tall structures (e.g., turbines, met tower locations, transmission infrastructure) may be relative to the locations of airports and flight patterns and airspace associated with the airports. Section 4.7.2 of BLM (2005) describes aviation considerations associated with wind energy. Section 4.7.2 of BLM (2005) outlines the conditions where contact with the FAA is required regarding construction or alteration of objects in navigable airspace.

3.8.2.1 Affected Environment

3.8.2.1.1 AIRSPACE AND AIRPORTS

Navigable airspace within the United States is primarily controlled and coordinated by the FAA. This section provides a summary description of airspace and air navigation procedures relevant to assessing potential impacts of the project on regional aviation resources. Detailed information regarding airspace and air aviation can be found in the FAA Aeronautical Information Manual (FAA 2023b). Airspace is divided into specific classes based on the regulations associated with aircraft operations within each class, including operations related to visibility and altitude. Airspaces are generally defined as controlled or uncontrolled. Controlled airspaces are those in which aircraft are usually under positive radar control and in communication with an FAA air traffic control facility for flights operating under certain flight rules, which are further described below. Airspace classes and their applicability to the project and analysis area are described in Table 3.8-8. Airspace over the siting corridors is Class E (controlled) and Class G (uncontrolled).

Table 3.8-8. Navigable Airspace Classes

Class	General Description	Location Relative to Siting Corridors and Analysis Area Considerations
Class A	Controlled airspace above 18,000 feet above mean sea level (amsl) and up to and including 60,000 msl	Over the siting corridors and analysis area
Class B	Controlled airspace above the nation's busiest airports; approximately 10,000 feet above ground level (agl) and below	Not located in the siting corridors or analysis area
Class C	Controlled airspace above certain airports; approximately 4,000 feet agl and below	Not located in the siting corridors or analysis area
Class D	Controlled airspace above certain airports; approximately 2,500 feet agl and below	Class D airspace associated with Magic Valley Regional Airport (Air Traffic Control from 6:00 a.m. to 9:00 p.m.) (FAA 2023c)
Class E	Other controlled airspace above 14,500 feet amsl; airspace used for transition aircraft	Over the siting corridors and analysis area
Class G	Other designated airspace 14,500 feet amsl and below; uncontrolled airspace and uncontrolled airports or landing areas	Over the siting corridors and analysis area, including all airports and landing areas listed in Table 3.8-9, except for Magic Valley Regional Airport.

Source: FAA (2023a).

Victor Airways, Flight Rules, and Aeronautical Charts

Low Altitude Federal Airways, commonly referred to as Victor airways, are corridors commonly traveled by aircraft operating under visual flight rules (VFR) and instrument flight rules (IFR). Victor airways connect FAA electronic navigational aids (known as VORs), which are often located near airports or other high-traffic areas, allowing pilots to navigate easily from one VOR or airport to another airport. Victor airways are generally 4 miles wide and start at 1,500 feet above ground level, and they extend upward to 18,000 feet above mean sea level (amsl). Victor airways are designated as Class E airspace and are regulated and defined under FAA Order JO 7400.2P (20-3-1).

VFR routes are areas and corridors that are commonly associated with VFR operations in a particular area. They may include routes that VFR pilots commonly follow, such as rivers, mountain passes, major highways and electronic navigation corridors, such as Victor airways. VFR routes can be undefined and are open to interpretation. VFR routes must be considered by the FAA Obstruction Evaluation Group and FAA Flight Standards personnel when addressing aeronautical studies. Although Victor airways are often associated with VFR routes, they are not necessarily VFR routes. VFR routes are not designated as a particular class of airspace but are considered and defined under FAA Order JO 7400.2P (6-3-8). With some exceptions, VFR rules require pilots to maintain a safe distance of at least 500 feet from all structures (14 CFR 91 [General Operating and Flight Rules]).

The published FAA VFR Sectional Chart depicts a wide range of information such as types of airspace and Victor airways, associated altitudes, obstructions, and visual reference information for pilots operating under VFR. The VFR Sectional Chart over the analysis area is shown on Figure 3.8-1 (SkyVector 2023). Victor airways over the analysis area include airways associated with Burley Municipal Airport, Jerome County Airport, and Magic Valley Regional Airport.

During periods of good visibility, and under 18,000 feet amsl, pilots generally operate under a concept of "see and avoid." As the term suggests, pilots use visual means to avoid weather, obstacles, and other aircraft. To operate using the see and avoid concept, certain visibility requirements are required for each of the different airspaces. These conditions are known as visual meteorological conditions.

If visibility is below the FAA requirements for a particular airspace, then instrument meteorological conditions (IMC) are in effect. At altitudes over 18,000 amsl, during periods of IMC conditions, and/or for the purpose of commercial cargo and passenger flights, aircraft generally operate under a set of rules known as IFR. While operating under IFR, pilots must operate by reference to instruments in the aircraft and follow very strict rules regarding altitudes, communications, and airspeeds. Prior to flying under IFR, pilots must file and receive a clearance from the FAA (14 CFR 91.169 [IFR Flight Plan: Information Required]). Although pilots may elect to file and operate under IFR during periods of good visibility, during poor visibility, aircraft always operate under IFR while in controlled airspace. IFR operations add more complexity to operational regulations and have more intensive certificate requirements for both pilots and aircraft.

When operating under IFR under 18,000 feet amsl, pilots use the FAA Low Altitude Enroute Chart to aid navigation (see Figure 3.8-2 [SkyVector 2023]). The Low Altitude Enroute Chart includes information such as airspace, air traffic control information, airports, IFR airways, distance and route data, minimum safe altitudes, military training routes, and other low-altitude waypoint information.

Wind turbine locations are identified on FAA VFR aeronautical charts. Pilots are required to maintain the appropriate lateral and vertical separation from wind turbines, as required by 14 CFR 91.119. Starting in August 2023, the FAA began updating aeronautical charts to more clearly depict the location of wind turbines, including improved identification of the boundaries of wind turbine project areas, adding cross-hatching to the areas for increased contrast, and including the amsl elevation of the highest obstruction within a wind farm project area (FAA 2023d).

Similarly, other tall structures are also identified on aeronautical charts, including electrical infrastructure, communication towers, and met towers.

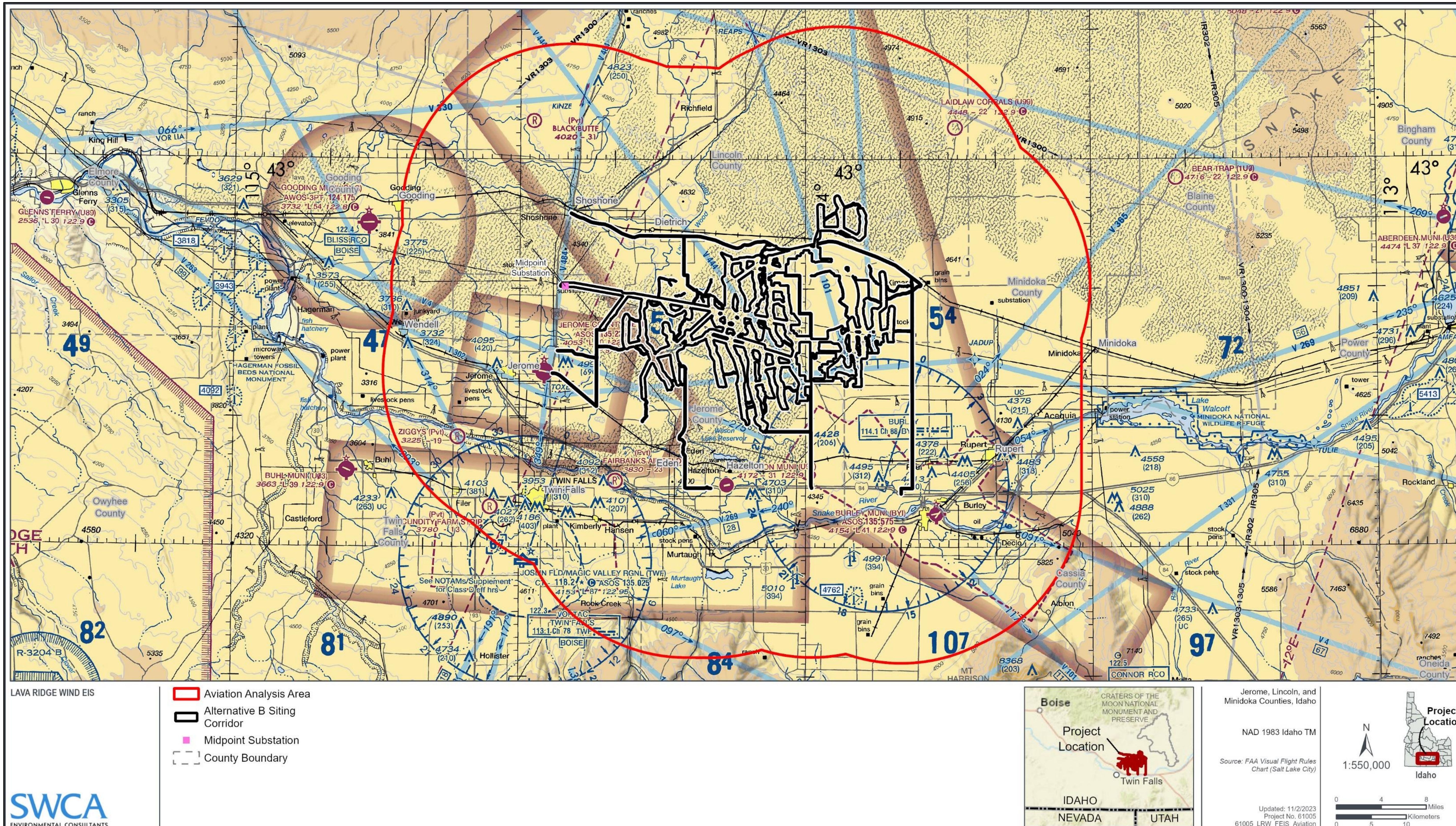

Figure 3.8-1. Aviation analysis area visual flight rules section chart.

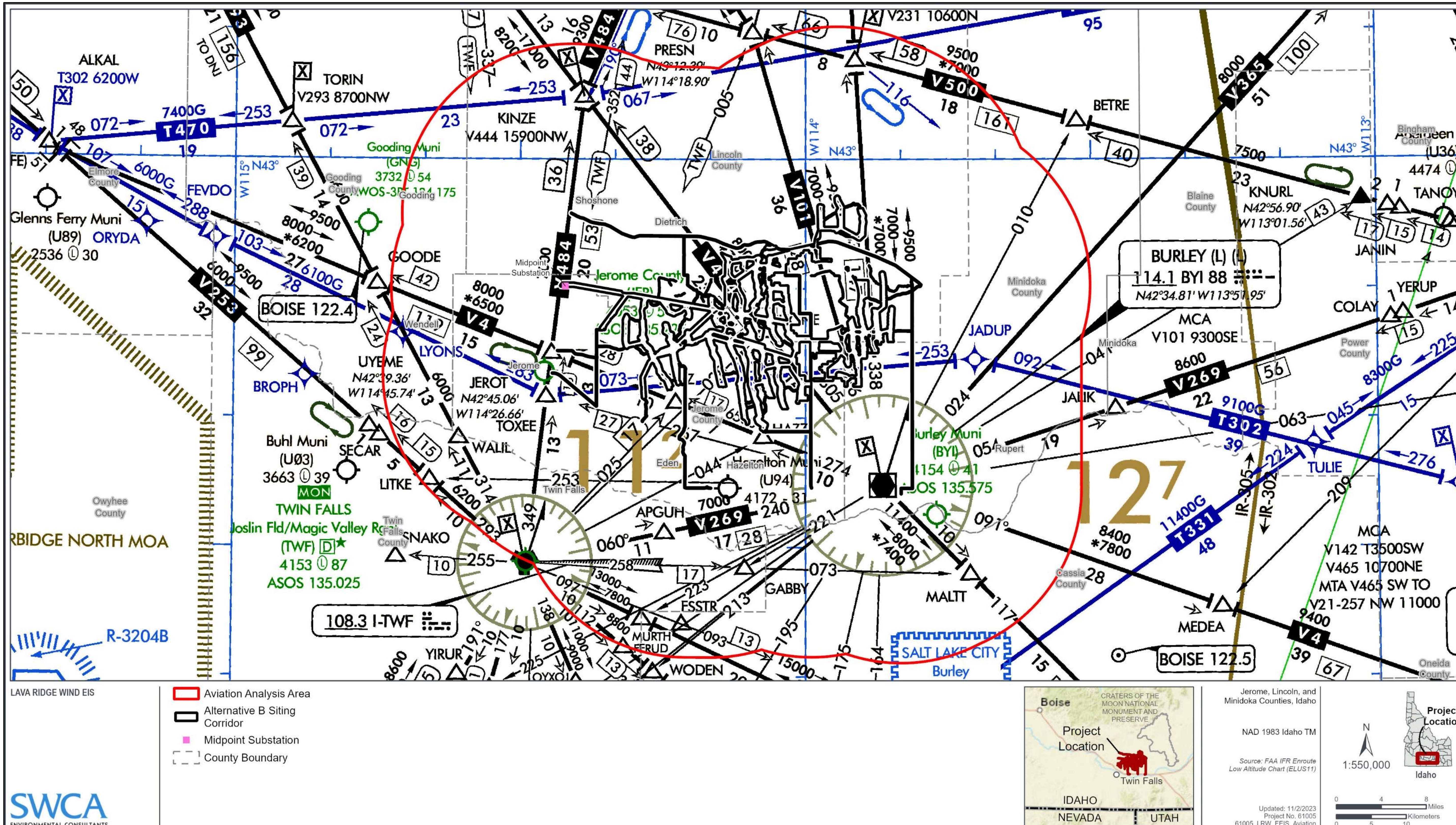

Figure 3.8-2. Aviation analysis area low-altitude enroute chart.

Airports and Landing Areas

The FAA has some regulatory authority over the airspace immediately surrounding public airports identified within the NPIAS. NPIAS airports generally include most commercial service and paved general aviation airports with higher levels of use. Smaller, unpaved, rural, low-use airports often do not meet NPIAS eligibility requirements, and private airports are also ineligible for NPIAS inclusion. NPIAS airports that are currently obligated by federal grant assurances require sponsors to have airspace protection standards in place, as required pursuant to various applicable federal airport development standards, primarily found within 14 CFR 71 (Designation of Class A, B, C, D, and E Airspace Areas; Air Traffic Service Routes; and Reporting Points), 14 CFR 77 (Safe, Efficient Use, and Preservation of Navigable Airspace), and FAA Advisory Circular 150-5300-B (Airport Design).

There are no airports or landing areas in the siting corridors; however, several public and private airports and landing areas are within 15 miles of the turbine siting corridors, as described in Table 3.8-9 and shown on Figure 3.8-3. The analysis area includes three public NPIAS airports (Burley Municipal Airport, Jerome County Airport, and Magic Valley Regional Airport) and two other public non-NPIAS airports and landing areas (Hazelton Municipal and Laidlaw Corrals). There are 13 other private or unknown non-NPIAS airports and landing areas in the analysis area (see Table 3.8-9).

Two private, unregistered and unmarked landing areas, reported to be used by agricultural aircraft, are approximately 1 to 2 miles from the nearest Alternative B turbine siting corridor (Figure 3.8-4). These private agricultural landing areas are used to support agricultural aerial operations, which are described below in Section 3.8.2.1.2 (Aerial Operations). Hazelton Municipal (public non-NPIAS airport) is the closest airport at approximately 6 miles from the nearest Alternative B turbine siting corridor. The nearest public NPIAS airport is Jerome County Airport, approximately 7.5 miles from the nearest Alternative B turbine corridor. The public airports in the analysis area offer general commercial aviation services and charter flights. The Magic Valley Regional Airport (approximately 20 miles from the Alternative B turbine siting corridors) has two daily nonstop flights to Salt Lake City, Utah, served by a national air carrier (City of Twin Falls 2023).

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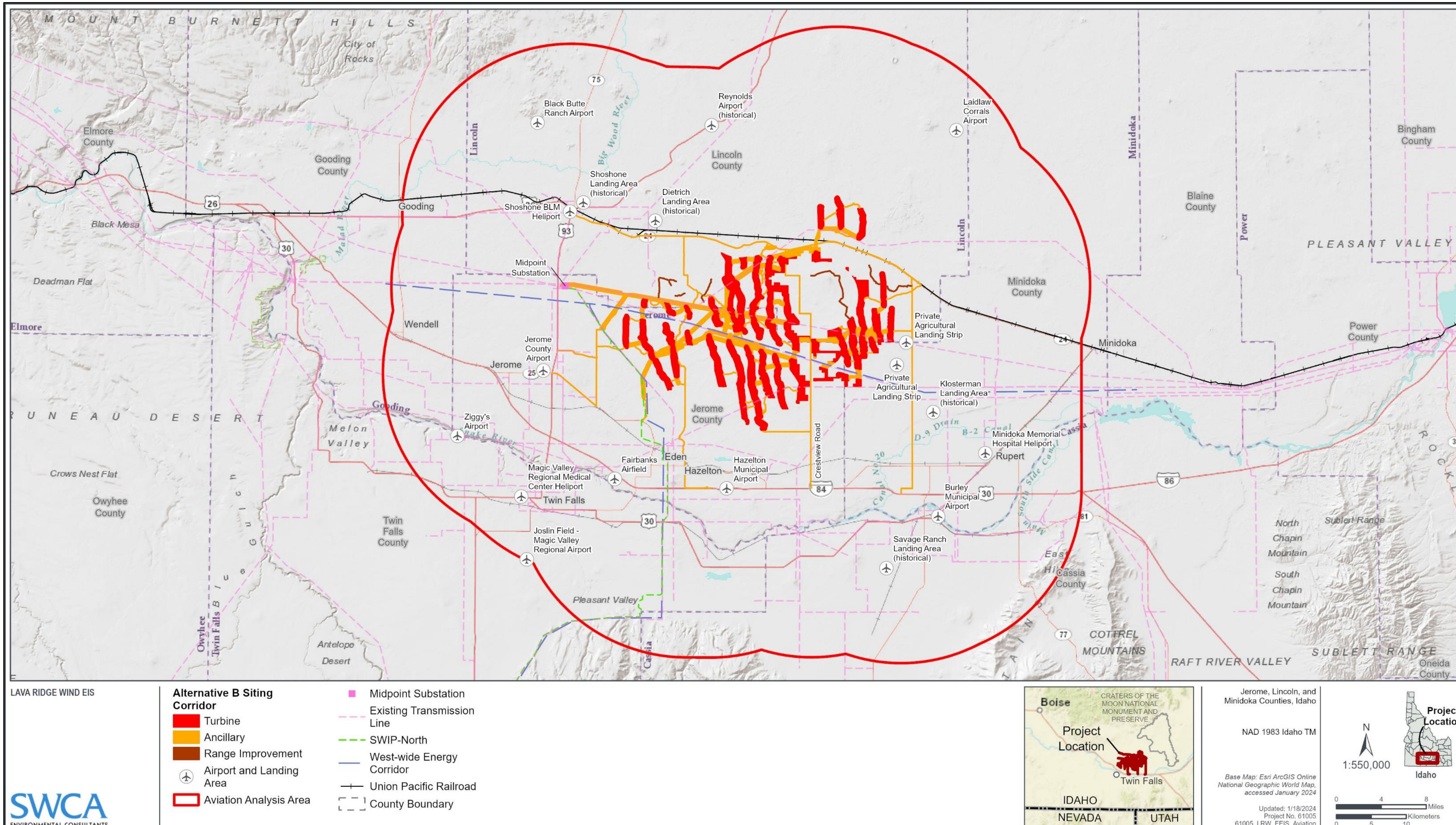

Figure 3.8-3. Public and private airports and landing areas within 15 miles of the siting corridors.

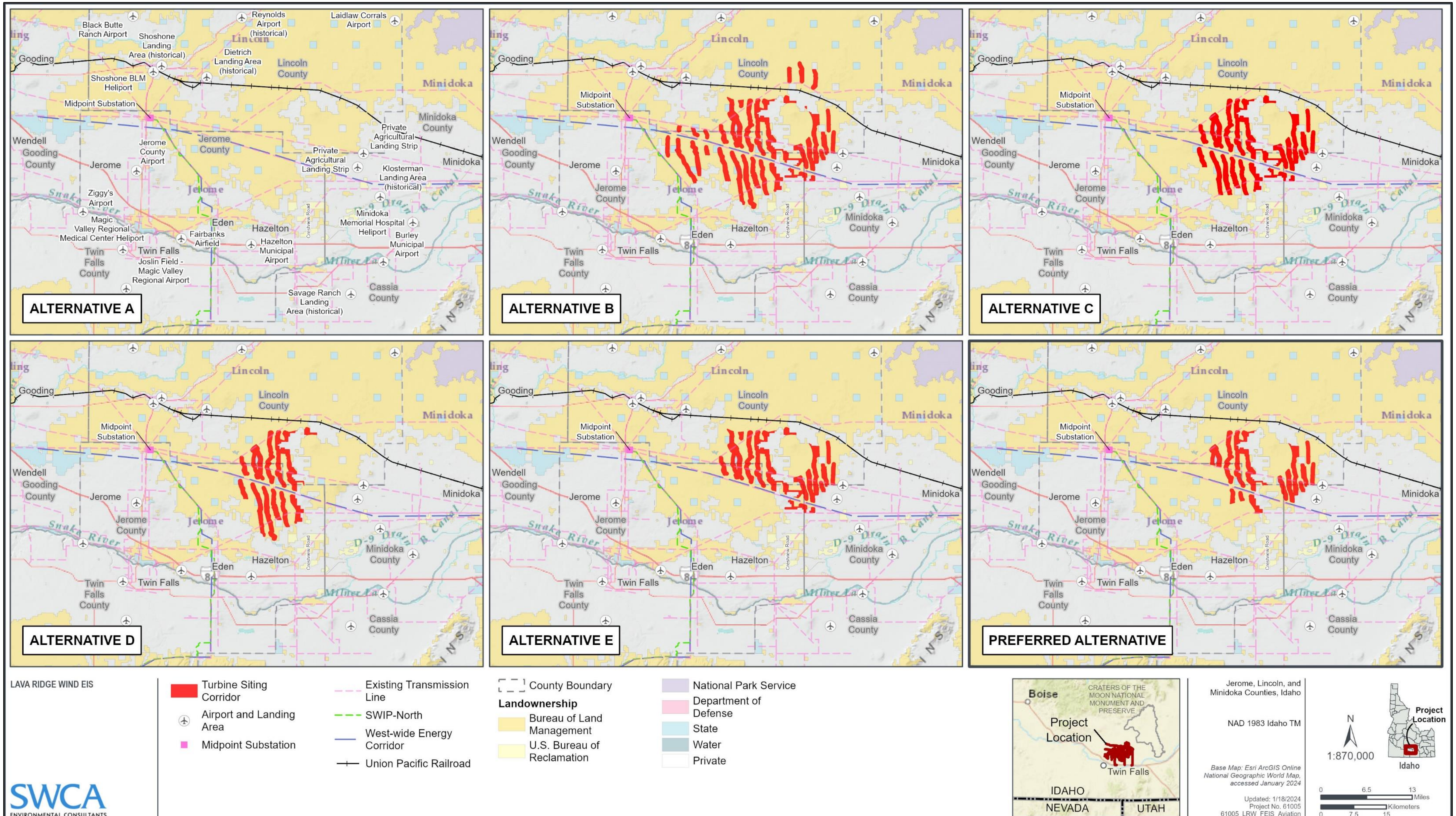

Figure 3.8-4. Public and private airports and landing areas within 15 miles of the turbine siting corridors by alternative.

Table 3.8-9. Airports and Landing Areas in the Analysis Area and their Distances (miles) to the Turbine Siting Corridors

Airport or Landing Area	FAA Identifier	Owner	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Public NPIAS Airports							
Burley Municipal Airport	KBYI	City of Burley	13.37	13.37	15.47	13.37	14.68
Jerome County Airport	KJER	Jerome County	7.48	14.73	14.73	15.66	17.18
Magic Valley Regional Airport	TWF	City of Twin Falls/Twin Falls County	19.54	23.25	22.84	26.63	26.49
Public Non-NPIAS							
Hazelton Municipal	U94	Jerome County	5.92	7.19	5.92	12.28	10.7
Laidlaw Corrals	U99	State of Idaho	10.81	14.14	15.92	14.14	14.14
Private Non-NPIAS							
Fairbanks Airfield	1ID7	Private (individual)	9.16	12.82	12.51	16.24	15.94
Black Butte Ranch	01D4	Private (individual)	18.15	21.72	21.72	19.99	22.1
Ziggys Airport	0ID1	Private (individual)	16.78	23.61	23.61	24.86	26.43
Minidoka Hospital (heliport)	ID53	Private (Minidoka County Hospital)	12.49	12.49	16.45	12.49	12.79
Magic Valley Regional Medical Center (heliport)	ID45	Private (Magic Valley Regional Medical Center)	16.07	20.79	20.79	22.93	23.82
Other Non-NPIAS							
Shoshone Landing Area (historical)	None	Unknown	9.96	13.96	13.96	13.03	14.63
Dietrich Landing Area (historical)	None	Unknown	6.49	8.26	8.26	6.49	8.46
Klosterman Landing Area (historical)	None	Unknown	6.76	6.76	11.17	6.76	7.14
Reynolds (historical)	None	Unknown	11.31	12.25	12.25	11.31	12.25
Savage Ranch (historical)	None	Unknown	16.26	16.26	16.27	16.26	17.48
Shoshone BLM (heliport)	None	BLM	10.01	14.49	14.49	13.93	15.3
Private agricultural landing area	None	Unknown	1.1	1.1	8.45	1.1	1.1
Private agricultural landing area	None	Unknown	1.95	1.95	7.84	1.95	1.95

Instrument Approach Procedures

For an aircraft to attempt to land or take off from an airport when operating under IFR and/or in IMC conditions (low visibility), an airport must have a published instrument approach procedure (IAP) (14 CFR 95 [IFR Altitudes] and 97 [Standard Instrument Procedures]). An IFR-rated pilot with clearance from air traffic control can use an IAP to fly an appropriately equipped aircraft, solely by reference to instruments, to approach an airport and attempt a landing. The visibility minimums and altitude that an aircraft can descend down to while conducting an IAP depends on several factors, including the type of aircraft, speed, and surrounding obstructions. Published IAPs include a very detailed visual chart (referred to as a "plate") that pilots use when conducting an IAP. The following analysis area airports have IAPs: Burley Municipal Airport, Jerome County Airport, Gooding Municipal, and Magic Valley Regional Airport (FAA 2023e).

A pilot flying either VFR or IFR enroute, to or from an airport that does not have a published IAP, would need to have visual meteorological conditions (good visibility) at the airport, unless a special VFR clearance is obtained from air traffic control. A special VFR clearance may allow a pilot to fly in areas that legally require IFR but where navigation can still be accomplished visually.

3.8.2.1.2 AERIAL OPERATIONS

Aviation for fire suppression activities is discussed in Section 3.7 (Fire and Fuels Management).

Aerial operations occur throughout the analysis area on agricultural lands (862,321 acres or 46% of the analysis area) and grazing allotments (780,388 acres or 41% of the analysis area). The U.S. Department of Agriculture Wildlife Services program conducts livestock predator control from small aircraft in the analysis area. Also, agricultural application of herbicides, pesticides, fungicides, insecticides, and fertilizers from low-flying aircraft (commonly referred to as crop dusting) is a common aerial operation within the analysis area. Other aerial applications that may occur in the analysis area on grazing lands include the application of herbicides for noxious weed management. Aerial application generally occurs during the growing season (spring, summer, and fall), and the applications vary by the types of crops, annual crop rotation, and weather. Aerial applicators use the public and private airports and landing areas in the analysis area.

Aerial applicators are required to have an FAA agricultural aircraft operator certificate, and their operations are subject to FAA regulations contained in 14 CFR 137 (Agricultural Aircraft Operations). Aerial applicators are required to operate under the same VFR and IFR rules as all other pilots; however, given the nature of the work, it is unlikely that aerial applicators would conduct operations while under IFR or IMC conditions. Existing hazards to low-flying aircraft performing aerial operations (such as aerial applications, livestock predator control, and fire suppression) in the analysis area include electrical infrastructure, communication towers, and met towers.

3.8.2.1.3 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions associated with tall structures, including electrical infrastructure, communication towers, met towers, and renewable energy facilities, have and would continue to influence aviation resources in the analysis area through infrastructure development that creates aviation concerns.

3.8.2.2 Impacts

3.8.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and aviation resources would only be affected by the existing and future trends and actions.

3.8.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Section 5.10.2 of BLM (2005) describes potential impacts to aviation associated with wind energy. BLM (2005) found that because a wind energy development project would have to meet appropriate FAA criteria, no adverse impacts to aviation would be expected. The analysis in this EIS considers the potential for adverse aviation impacts on regional aviation resources to occur regardless of the project meeting FAA required criteria.

MVE filed Form 7460-1 Notice of Proposed Construction or Alteration with the FAA for Alternative B with a maximum turbine height of 660 feet above ground level (approximately 4,933 feet amsl). The FAA issued a Notice of Presumed Hazard on February 2, 2023, which initiated an FAA public comment period and aeronautical study (FAA 2023a [Aeronautical Study No. 2022-WTW-4666-OE]). The comment period closed on March 11, 2023. As part of the Notice of Presumed Hazard, the FAA public notice contained a preliminary list of detailed impacts that would result in exceeding current federal obstruction standards (as per 14 CFR 77.17(a)(1) and (3)) and the other effects on aeronautical operations (as per 14 CFR 77.29 (a)(1) The FAA aeronautical study is underway, and results of the final study were not available at the time of EIS publication. The analysis contained herein references the preliminary analysis that was disclosed in the FAA public notice.

Per MVE's applicant-committed measures 20, 21, and 26 (see Table App4-2c in EIS Appendix 4), MVE would obtain all necessary permits from the FAA for necessary lighting and turbine group locations and would coordinate with the FAA to resolve any aviation concerns in the analysis area. The FAA would make a Determination of No Hazard or a Determination of No Hazard with Conditions to air navigation for each individual turbine, and turbines would not be built in locations that do not receive a Determination of No Hazard from the FAA. Further, per MVE's applicant-committed measure 26, the BLM's notice to proceed for MVE's project construction would be contingent upon receiving the FAA's determinations.

Airspace and Airports

Alternative B would introduce new obstructions to the analysis area. The introduction of any obstruction, by definition, is likely to have some adverse impact on airspace; however, wind energy developments in similar areas, with similar uses and airspace, are a relatively common occurrence within the aviation industry and the effects of which have been effectively mitigated through compliance with FAA procedures. The FAA has very specific and effective procedures for ensuring safe distances are maintained from obstructions, primarily the development of airport obstruction design standards; amendments to published flight procedures; identifying obstructions as required; and through pilot education, training, and certification.

Alternative B would not reduce the usefulness of the existing overlying FAA airspace, except for within 500 feet of obstructions, and there would be no significant impact to the use of the identified and registered airports in the analysis area. Impacts to airspace and airports are further described below.

The Alternative B turbine siting corridors (84,051 acres) and up to 400 3-MW turbines or up to 349 6-MW turbines would be located within 2 miles of the centerline of a Victor airway. The presence of turbine structures greater than 499 feet above ground level may require an increase in the published minimum altitudes associated with the Victor airway. Preliminary study results within the FAA public notice (FAA 2023a) identified that VFR routes would be adversely impacted by the turbines as configured under Alternative B.[9] The FAA study did not identify if the particular VFR routes were associated with the published Victor airways near the siting corridors; however, for this analysis, it is assumed that they are associated. There are no known high-density VFR operations or routes near the siting corridors. Additional impacts to navigation are likely from the presence of other tall structures, including transmission towers and met towers. The final FAA study would provide detailed impacts to airspace and identify required changes to published altitudes and instrument procedures, including the VFR Sectional Chart, IFR Low Altitude Enroute Chart, and associated instrument approach plates. Where impacts to VFR routes are identified by the FAA, the FAA would offer potential mitigation efforts that would offset the impacts, such as required marking and lighting. These mitigation efforts would be issued as part of the FAA's Determination of No Hazard with Conditions.

Under Alternative B, pilot operations would be similar to other navigation hazards occurring within the analysis area from existing tall infrastructure, including transmission towers, communication towers, and met towers. Upon construction of the project, the FAA would update affected aeronautical publications to appropriately depict the general location of the turbines and related obstruction. Pilots operating under VFR in the associated Class E and Class G airspace in the analysis area would still be required to navigate using the see and avoid concept around the turbines or other obstructions (transmission towers or met towers). As described above in Section 3.8.2.1.1, pilots operating under IFR must operate by reference to instruments in the aircraft and follow very strict rules regarding altitudes, communications, and airspeeds. When operating under IFR under 18,000 feet amsl, pilots use the FAA Low Altitude Enroute Chart to aid navigation.

FAA regulations at 14 CFR 77.9 require developers to notify the FAA of any proposed structures that exceed the imaginary surfaces set forth within the regulations, including a slope of 100:1, within 20,000 feet (3.78 miles) of an airport. Preliminary results, as published in the public notice of the FAA study, indicate that the proposed structures would require some changes to minimum altitudes associated with IAPs for Jerome County Airport, Magic Valley Municipal Airport, and Burley Municipal Airport (FAA 2023a). These initial changes indicate a slight elevation increase for initial approach altitudes, arcs, and minimum safe altitudes (ranging from 100 to 300 feet amsl), as well as some minor changes to procedure turn altitudes and departure takeoff minimums and obstacle departure procedures. Of the three airports evaluated in the FAA study, Burley Municipal Airport had the greatest number of impacts to IAP procedures (FAA 2023a). No impacts to approach slope surfaces or other FAA airport design related airport surfaces were identified. The final FAA study will identify the final impacts to all FAA regulated airspace and IAPs.

Preliminary impacts identified in the FAA study may not necessarily address impacts to private or other unpublished airport landing areas; however, similar impacts to those facilities may occur depending upon the proximity of the final turbine layout to those airports or landing areas.

It is anticipated that the FAA would require turbines and other tall structures exceeding a height of 200 feet above ground level to be marked or lighted per FAA guidelines. Through consultation with the FAA, MVE is investigating deployment of an ADLS to mitigate the need for continuous operation of the red

[9] The FAA application and subsequent public notice included a maximum tip height of 660 feet above ground level (FAA 2023a). Alternative B includes a maximum tip height of up to 740 feet above ground level. Impacts associated with a 740-foot turbine are assumed to be equal to or greater than the 660-foot turbine height evaluated in the FAA public notice.

flashing lights during nighttime hours. An ADLS comprises one or more elevated radars that scan the region proximate to the siting corridors for aircraft and only activates the red flashing lights on the turbines when an aircraft is detected within a specified distance. The ADLS would provide visibility of the turbines to pilots.

Effects to communication pathways (including electromagnetic interference) are addressed in Section 3.8.1.2.2 in the Land Use and Realty section. Further, the FAA study will consider potential effects to radar and electromagnetic interference.

Based on the preliminary FAA study results, aviation uses in the analysis area, and the probable effects to airspace and airports, no quantifiable or significant economic impacts to aviation are anticipated.

Aerial Operations

Tall structures, as defined by aviation industry standards, are considered obstructions, and may pose a potential hazard to aircraft conducting aerial operations in their vicinity. The obstructions would not restrict aerial operations in the analysis area, except for the immediate airspace within 500 feet of the obstructions. There are no known high-density VFR operations or routes near the siting corridors. The only known uses of the very-low altitude area in the immediate vicinity of the siting corridor airspace are aerial operations (including livestock predator control and aerial herbicide application) and fire suppression (refer to Section 3.7 [Fire and Fuels Management] for discussion of fire suppression activities). Other than the loss of the use of the immediate airspace within 500 feet of the obstructions, it is conservatively assumed that any potential hazards to VFR aerial operations would be greatest within 2 miles of the turbine siting corridors. VFR maneuvering within the 2-mile corridor would be at the pilot’s discretion (14 CFR 91) and relatively unimpacted by the obstructions, except for within 500 feet of the obstructions themselves. Pilots would need to assess situation-specific risks when flying near the turbine siting corridors.

There are approximately 183,196 acres of agricultural lands and 250,711 acres of grazing allotments in a 2-mile buffer of the Alternative B turbine siting corridors. Two agricultural landing areas were identified 1 to 2 miles east of the Alternative B turbine siting corridors (see Figure 3.8-3). The project would not preclude aerial applicators from operating under VFR 14 CFR 91 limitations within the turbine siting corridors or the 2-mile buffer, except for flying within 500 feet of the obstructions themselves. There are no known agricultural fields or crops that would not be able to be serviced by aerial applicators as a direct result of obstructions being near the fields themselves; however, some routes or flight patterns used by aerial applicators while transitioning to and from specific fields may have to be altered to better allow pilots to “see and avoid” obstruction hazards. Aerial applicator flight patterns often vary by type of aircraft, specific crops, and wind direction; therefore, it is not always possible to predict the specific areas that may be impacted.

Additionally, MVE has committed to a setback distance of 1.1 times the maximum turbine tip height from non-participating landowners, which would further set back turbines from adjacent agricultural lands. Wind turbines are prevalent adjacent to agricultural lands across the United States, and no studies were identified during this analysis that demonstrate a significant increase in aerial application cost for agricultural lands adjacent to wind facilities. Based on the analysis of the probable effects to aerial operations, no quantifiable or significant economic impacts to aerial operations are anticipated.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE’s POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for aviation are summarized in Table 3.8-10 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.8-10. Mitigation for Aviation

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
20	–	lll
21	–	mmm
26	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of these measures would further minimize the potential for aviation impacts through increased coordination with the FAA, regional airports, and aviation related stakeholders.

3.8.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Airspace and Airports

Alternative C would have similar impacts to airspace and airports as Alternative B; however, impacts would be reduced due the reduced western siting corridors and total number of turbines (see Figure 3.8-4; refer to EIS Table 2.4-1 for number of turbines by action alternative). Acres of siting corridors lying underneath Class E and Class G airspace would be reduced by approximately 22% as compared to Alternative B. Turbine siting corridor distances to airports or landing areas would be increased under Alternative C, except for Burley Municipal Airport, Minidoka Hospital, Klosterman Landing Area, Reynolds, Savage Ranch, and the two agricultural landing areas whose distances are similar to Alternative B (see Table 3.8-9).

Aerial Operations

Approximately 149,607 acres of agricultural lands and 211,430 acres of grazing allotments are in a 2-mile buffer of the Alternative C turbine siting corridors. Potential for changes to aerial operations flight patterns under Alternative C would be reduced on the western side of the turbine siting corridors as compared to Alternative B. As described above, the distances to the two agricultural landing areas would be similar to Alternative B.

3.8.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Airspace and Airports

Alternative D would have similar impacts to airspace and airports as Alternative B; however, impacts would be reduced due the centralized siting corridors and total number of turbines (see Figure 3.8-4; refer to EIS Table 2.4-1 for number of turbines by action alternative). Acres of siting corridors lying underneath Class E and Class G airspace would be reduced by approximately 42% as compared to Alternative B. Turbine siting corridor distances to airports and landing areas would be increased under Alternative D, except for Hazelton Municipal, Reynolds, and Savage Ranch whose distances are similar to Alternative B (see Table 3.8-9). Distances to Burley Municipal Airport (15.47 miles), Laidlaw Corrals

(15.92 miles), and the two agricultural landing areas (8.45 miles and 7.84 miles) are greatest under Alternative D.

Aerial Operations

Approximately 91,549 acres of agricultural lands and 169,387 acres of grazing allotments are in a 2-mile buffer of the Alternative D turbine siting corridors, which is the fewest acres of all action alternatives. Potential for changes to aerial operations flight patterns under Alternative D would be reduced by the centralized turbine siting corridors as compared to Alternative B. The centralized turbine siting corridors under Alternative D would have reduced impacts to agricultural lands east of the Alternative D turbine siting corridors as compared to all other action alternatives (see Figure 3.8-4). As described above, distances to the two agricultural land areas is greatest under Alternative D.

3.8.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Airspace and Airports

Alternative E would have similar impacts to airspace and airports as Alternative B; however, impacts would be reduced due the reduced southern siting corridors and total number of turbines (see Figure 3.8-4; refer to Table 2.4-1 for number of turbines by action alternative). Acres of siting corridors lying underneath Class E and Class G airspace would be reduced by approximately 40% as compared to Alternative B. Turbine siting corridor distances to airports and landing areas would be increased under Alternative E, except for Burley Municipal Airport, Minidoka Hospital, Dietrich Landing Area, Klosterman Landing Area, Reynolds, Savage Ranch, and the two agricultural landing areas whose distances are similar to Alternative B (see Table 3.8-9). Distances to the Magic Valley Regional Airport (26.93 miles) and Fairbanks Airfield (16.24 miles) are greatest under Alternative E.

Aerial Operations

Approximately 126,171 acres of agricultural lands and 185,608 acres of grazing allotments are in a 2-mile buffer of the Alternative E turbine siting corridors. Potential for changes to aerial operations flight patterns under Alternative E would be reduced by the centralized turbine siting corridors as compared to Alternative B. As described above, the distances to the two agricultural landing areas would be similar to Alternative B.

3.8.2.2.6 PREFERRED ALTERNATIVE

Airspace and Airports

The Preferred Alternative would have similar impacts to airspace and airports as Alternative B; however, impacts would be reduced due the reduced centralized siting corridors and total number of turbines (see Figure 3.8-4; refer to EIS Table 2.4-1 for number of turbines by action alternative). Additionally, the Preferred Alternative would include a maximum tip height of 660 feet for all turbines, which, depending upon the final turbine layout, may further reduce impacts to airspace and airports as compared to all other action alternatives with a maximum tip height of up to 740 feet.

Acres of siting corridors lying underneath Class E and Class G airspace in the Preferred Alternative is the smallest siting corridor acreage of all actions alternatives and would be reduced by 47% as compared to Alternative B. Turbine siting corridor distances to most airports and landing areas would be increased as compared to Alternative B, except for Minidoka Hospital, Klosterman Landing Area, Reynolds, and the two agricultural landing areas whose distances are similar to Alternative B (see Table 3.8-9). The distances to Jerome County Airport (17.18 miles), Black Butte Ranch (22.1 miles), Ziggys Airport (26.43 miles), Magic Valley Regional Medical Center (23.82 miles), and Shoshone BLM (15.3 miles) are greatest under the Preferred Alternative.

Aerial Operations

Approximately 113,931 acres of agricultural lands and 177,453 acres of grazing allotments are in a 2-mile buffer of the Preferred Alternative turbine siting corridors. This acreage is less than Alternatives B, C, and E but greater than Alternative D. Potential for changes to aerial operations flight patterns by aerial operations under the Preferred Alternative would be reduced by the centralized turbine siting corridors as compared to Alternative B. Additionally, the reduced turbine siting corridors under the Preferred Alternative would facilitate more options for flight paths to agriculture lands in the central portion of the project as compared to Alternatives B, C, and E (see Figure 3.8-4). As described above, the distances to the two agricultural landing areas would be similar to Alternative B.

Additionally, under the Preferred Alternative, turbines would be set back from non-participating private landowners by 1.5 times the maximum turbine tip height, or 1,000 feet (whichever is greater), from the property line and five-times the total turbine height from existing residences. These setback distances are greater than under all other action alternatives and would further increase the distance of turbines from adjacent agricultural lands.

3.8.2.2.7 CUMULATIVE IMPACTS

Existing and future trends and actions associated with electrical infrastructure, communication towers, and renewable energy facilities would continue to influence existing aviation resources in the analysis area through development of tall infrastructure. When combined with the effects of Alternative B, impacts to airspace, airports, and aerial operations would be further compounded.

As previously discussed for the affected environment, the FAA regulates airspace and FAA Determination of No Hazard or a Determination of No Hazard with Conditions are required for structures exceeding 200 feet above ground level. Reasonably foreseeable development projects would need to comply with these FAA regulations, which are intended to minimize hazards to navigation.

3.8.2.3 Significance Determination

Under all action alternatives, potential impacts to aviation resources, including regional airports, controlled airspace, and aerial operations, would not be significant. The preliminary results of the FAA's study identified some changes in minimum altitudes associated with IAPs for Jerome County Airport, Magic Valley Municipal Airport, and Burley Municipal, but no changes to approach slope surfaces or other airport design surfaces were identified (FAA 2023a). Final designs for developments authorized by any action alternative would be required to meet FAA standards and receive a Determination of No Hazard or Determination of No Hazard with Conditions.

The project developments would result in pilots having to "see and avoid" obstruction hazards, resulting in localized long-term effects near the siting corridors for the life of the project. However, wind turbines are prevalent in areas adjacent to agricultural lands across the United States, and no studies were identified during this analysis that demonstrated a significant increase in aerial application cost for agricultural lands adjacent to wind facilities, and the project is not expected to significantly reduce agricultural aerial operations.

3.8.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, construction, operation, and decommissioning of the project would result in long-term irretrievable effects near the siting corridors for the life of the project (i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives). These effects would no longer occur following decommissioning and final reclamation of the project.

3.9 LIVESTOCK GRAZING

3.9.1 Grazing Allotments and Range Socioeconomics

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.9-1.

Table 3.9-1. Analysis Approach for Grazing Allotments and Range Socioeconomic

Issue Analyzed in Detail	How would the project affect areas available for livestock grazing and subsequent forage availability (using AUMs) in BLM grazing allotments?
Associated Issues Analyzed in Brief	AIB-16: How would the project affect the functionality of range improvements during the allotment grazing period?
Analysis Area	All allotment boundaries that could be impacted by the project The analysis area for this issue was determined based on where project components are proposed and on the livestock management area that would be affected (i.e., allotment boundaries) (Figure 3.9-1).
Indicators	Acres of temporary and permanent reduction of forage availability through rest rotation, vegetation disturbance, or addition of infrastructure in grazing allotments in the analysis area (using an estimated change in AUMs). The change in AUMs was estimated by multiplying the current stocking rate by the change in available allotment acres.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives), which is described in more detail in EIS Section 2.3.3 [Project Phases and Duration] and in EIS Section 3.1.2.3 [Siting Corridors]). Within each of the project phases, interim reclamation would occur and would require an estimated two growing seasons for livestock forage to reestablish and grazing to resume, once BLM reclamation objectives are met. Final reclamation, following decommissioning, is estimated to require as few as 2 years but up to 5 years.
Data Sources	BLM allotment permit and AUM information, including historical AUM use and active AUMs and historical utilization. Allotment management plans for each allotment.
Assumptions or Approach	Existing livestock grazing permits would not be modified through this EIS. If part of the action alternatives would require modifications to grazing permits, this would be addressed in a subsequent NEPA analysis and permit actions, in accordance with CFR Subpart 4120, Grazing Regulations.

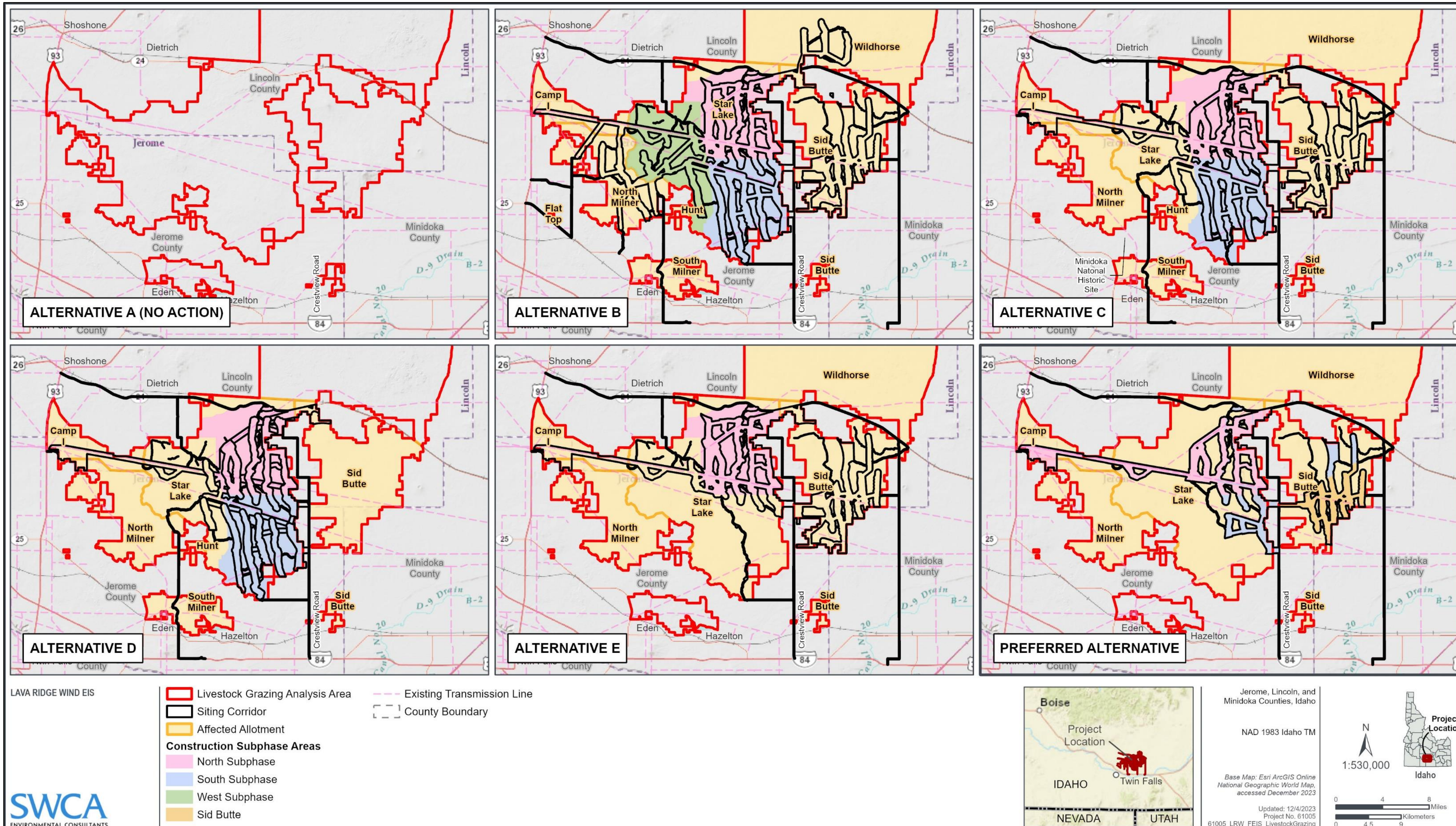

Figure 3.9-1. Livestock grazing analysis area and affected allotments per action alternative.

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3.9.1.1 Affected Environment

Livestock grazing plays an important economic and social role in southern Idaho. The livestock industry represents a core sector of commerce for the region and many families and communities depend on livestock grazing for their livelihoods (Lewin et al. 2019). These families and communities have strong ties to the livestock industry and have identified with the tradition, land use, and history of grazing in the area since the late 1860s. The livestock industry not only contributes to the region's economic stability but also the rural lifestyle for local residents and small community sense of place (Lewin et al. 2019). Moreover, the social networks of southern Idaho communities are often closely connected with grazing and agricultural life, and the economic well-being of the grazing community is of central importance to some rural southern Idaho towns. Rimbey et al. (1999) and Wulfhorst et al. (2006) found that in southern Idaho communities, livestock grazing is an essential and stabilizing social and economic contributor, which allows community members to feel connected to the land, to each other, and to the ranching community. In addition, the rural, open landscape of the analysis area provides a sense of place for the local grazing community, which holds meaning for and reflects the lifestyle, values, traditions, and cultural and social identities of the livestock community (Tanaka et al. 2005; Wulfhorst et al. 2006). Surveys have shown that it is common for members of the livestock grazing community to place an equal or higher value on the rural sense of place and lifestyle than the potential for economic gain or profit (Tanaka et al. 2005).

A BLM grazing permit is required for commercial livestock use on BLM public lands (temporary recreational use by riding and packing livestock is excluded or covered under a special use permit). The General Land Office oversaw grazing on public domain land outside Forest Reserve perimeters before 1934. The Taylor Grazing Act of 1934 (43 USC 315 et seq.) initiated comprehensive management of these lands under the Division of Grazing. The Division of Grazing and the General Land Office merged in 1946 to form the BLM. The FLPMA (43 USC 1701 et seq.), Public Rangelands Improvement Act of 1978 (43 USC 1901 et seq.), and BLM manual guidance under 43 CFR also direct management of livestock grazing on BLM public lands.

The project would intersect up to eight BLM public land grazing allotments depending on the action alternative. Table 3.9-2 identifies the eight allotments, their allotment number, total acres in each allotment, permitted AUMs, active AUMs, and authorized livestock class. The Flat Top allotment is currently unallotted (i.e., no permitted AUMs).

The AUM concept is the most widely used way to determine carrying capacity for grazing animals on rangelands and is used for BLM grazing permits to determine allotment stocking rates. An AUM is the "amount of forage necessary for the sustenance of one cow or its equivalent for a period of 1 month" (43 CFR 4100.0-5). Table 3.9-2 also includes the stocking rates calculated by dividing the active AUMs by the allotment acreage.[10]

For the allotments in the analysis area intersected by most of the siting corridors (Sid Butte and Star Lake), the BLM compiled historical actual use and utilization (EIS Appendix 12 [Historical Livestock Actual Use and Utilization]). Since 2011, the Star Lake actual use has been 67% to 98% of the active AUMs with an average of 94% actual use. For Sid Butte, the actual use has been 57% to 92% of the active AUMs with an average of 68% actual use.

[10] The stocking rates used in Table 3.9-1 may vary from those in previously-prepared permittee and BLM documents and analyses. These stocking rates were estimated based on the current active AUMs to provide a comparison of change in active AUMs between the action alternatives in this EIS. This EIS does not alter previously-permitted AUMs or stocking rates.

Table 3.9-2. Bureau of Land Management Livestock Grazing Allotments in the Analysis Area

Allotment Name	Allotment Number	Allotment Acres	Permitted Allotment AUMs (Active and Suspended)	Allotment Active AUMs*	Active AUMs Stocking Rate (acres per AUM)	Allotment Authorized Livestock Class
Camp I	90921	12,020	2,612	2,007	5.99	Cattle
Flat Top	91008	116	0	0	0.00	Not applicable
Hunt	90927	1,502	326	326	4.61	Cattle
North Milner	90924	27,984	4,854	4,712	5.94	Cattle, sheep
Sid Butte	80708	44,510	11,285	6,995	6.36	Cattle, sheep
South Milner	91012	10,009	1,715	1,526	6.56	Cattle, horse
Star Lake	80709	98,143	24,940	17,770	5.52	Cattle, sheep
Wildhorse	80711	240,801	28,061	28,061	8.58	Cattle, sheep

* Data from BLM (2022).

Section 3.15.1.1 (Affected Environment in Native Upland Vegetation Communities) provides a detailed description of the vegetation communities in the analysis area. Although much of the analysis area is mapped as native sagebrush steppe and grasslands, current vegetation conditions in much of the analysis area are predominantly disturbed and composed of nonnative grasses cheatgrass and crested wheatgrass, primarily due to past wildfires and historical livestock grazing. Disturbed vegetation communities throughout the analysis area are likely in varying states of recovery based on the time since disturbance and the degree to which active recovery and restoration measures have been implemented. Native species big sagebrush (*Artemisia tridentata*) and Sandberg bluegrass dominate the eastern siting corridors (WEST 2020). The southern siting corridors are dominated by nonnative grassland vegetation communities. Perennial grasses, including those from post-fire reseeding (see details in Section 3.15.1.1) and rehabilitation provide forage for livestock across the analysis area.

3.9.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and would continue to influence livestock grazing and range socioeconomics in the 684-square-mile (436,801 acres) analysis area through surface-disturbing activities and vegetation removal and impacts. Much of the analysis area is dominated by nonnative plant species; has experienced wildfire and vegetation changes associated with those fires (including reseeding); is disturbed by roads, development, vegetation treatment projects, or existing ROWs; and may be subject to ongoing and future surface- and vegetation-disturbing activities. Although some of these existing and future trends and actions may overlap, when the overlapping activities are accounted for, approximately 345,456 acres (79%) of the analysis area have been and will continue to be affected by the activities described above. In addition, the local livestock grazing economy is influenced by regional and national trends and developments within the broader livestock industry.

As described in EIS Section 3.1.1 (Existing and Future Trends and Actions), future development in the analysis area is likely to include construction of the SWIP-North transmission line and construction of the Gateway West transmission line. Three solar facilities and one wind energy facility are proposed on land west and northwest of the siting corridors and fall partially in the analysis area. The Invenergy Gem Vale solar facility would be just north of the Midpoint Substation on approximately 3,500 acres. Two Longroad Energy solar facilities would cover 3,500 acres each just east of U.S. 93 and south of (connecting to) the Midpoint Substation (for a total of 7,000 acres). If authorized by the BLM, these projects would add more roads, fences, transmission lines, and human activity to the analysis area; all the solar facilities would have fencing surrounding the facilities. Climate change could increase drought, wildfire frequency, and annual temperature. These trends and activities could cause changes in forage conditions, altering the forage availability for livestock grazing and altering existing range improvements.

3.9.1.2 Impacts

3.9.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, there would be no change in available AUMs and no corresponding loss of income for grazing permittees or changes to the local grazing economy brought on by the project. Existing and future trends and actions would occur as described under the affected environment and may affect livestock grazing permittees or the broader livestock grazing community.

3.9.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Under Alternative B, eight allotments would be impacted by the project. Because of the acres of affected vegetation, these allotments would have reduced forage availability for livestock grazing, as summarized in this section in Tables 3.9-3 through 3.9-8 (using AUMs), during the project phases and post-project. Forage reductions can directly affect grazing permittees through reduced income, profitability, and economic stability. In addition, forage reductions can have rippling socioeconomic effects on the broader livestock grazing community by disrupting and de-stabilizing rural lifestyles and social networks, introducing stress and uncertainty within the community, impacting commercial networks, and reducing economic activity generated by the livestock industry (Lewin et al. 2019). A Grazing Coordination Plan to minimize impacts to rangeland and grazing permittee operations is included as part of the POD (see Appendix S of MVE [2023]). The Grazing Coordination Plan outlines how the project would coexist with the grazing operations and implement measures to minimize impacts from the project. Sheep grazing can occur in any of the pastures where conflict would not occur with construction activities, at the permittee's discretion. Sufficient AUMs are available to provide grazing for all permitted sheep AUMs. Sheep permittees may need to be accommodated off-site during construction and reclamation at the discretion of the permittee. MVE is also offering alternative forage opportunities for sheep permittees.

As part of the Grazing Coordination Plan, no permanent fencing or removal of existing fencing would occur. However, approximately 50 miles of temporary fences could be installed along primary access roads to alleviate concerns about excess traffic during construction and interim reclamation, and another 295 miles of temporary fencing could be installed surrounding work areas (with 20%–25% estimated for deployment at any given time). Additionally, up to 65 water troughs may be installed to facilitate livestock distribution or access to water. Pipeline disturbance for the water troughs would occur within the project work areas. With use of temporary fences during the construction and decommissioning phases and additional water sources, grazing patterns and use across the affected allotments could change. Range improvement functionality would not be degraded from the existing condition. Any project changes to range improvements would maintain functionality (including stock watering, fences, and cattle guards), would be coordinated beforehand with the permittees and the BLM, and would be paid for by MVE. Although MVE would provide additional feed sources for affected AUMs during construction, there is still some potential for grazing permittees to experience economic uncertainty and risk as they adapt their grazing operations to the changing conditions. In addition, the broader livestock grazing community may experience a period of economic uncertainty and other adverse social effects (e.g., increased community stress) if the availability of feed sources within the overall community becomes uncertain.

As described in Section 3.8.2.2.2, tall structures such as construction cranes and turbines, as defined by aviation industry standards, are considered obstructions and may pose a potential hazard to aircraft conducting aerial operations (including livestock predator control) in their vicinity. The obstructions would not restrict aerial operations in the analysis area except for the immediate airspace within 500 feet of the turbines.

Construction and Decommissioning

Construction (estimated at up to 2 years for completion of all project construction activities) would include the building of roads, operation and maintenance facilities, turbine sites, and other associated infrastructure, as described in detail in Chapter 2 and EIS Appendix 11. During construction, temporary fences would exclude livestock from work areas with active construction occurring (see the Grazing Coordination Plan). The construction schedule within the Star Lake allotment would occur in three subphases (North, South, and West; see Appendix S of MVE [2023]; see Figure 3.9.1) so that construction occurs in approximately one third of the Star Lake allotment at any given time. Primary access roads to an active construction subphase area (for example the West subphase) would continue to be used through dormant subphase areas (for example the North subphase) to allow for sufficient access from ID 24. Concentrating construction activities in a single subphase area at a time would reduce the potential for conflicts between construction activities and livestock operations and reduce the amount of temporary fence necessary during construction. Within each of the project phases, interim reclamation would occur and would require approximately two growing seasons for livestock forage to reestablish and grazing to resume, once BLM reclamation objectives are met. Once construction and interim reclamation are complete, the temporary fence would be removed, and undisturbed areas that had been excluded within the temporary fence would be available again for livestock grazing. The Sid Butte allotment would have one laydown and staging yard. Two of three operation and maintenance buildings (for construction and decommissioning) and five laydown and staging yards would be in the Star Lake allotment. The third building and seventh laydown and staging yard would not be located in a livestock grazing allotment.

MVE has entered into agreements associated with permittee AUMs in both the Star Lake and Sid Butte allotments. In Star Lake, MVE’s arrangements would allow for up to 6,007 AUMs to be rested during the construction and restoration phases. In Sid Butte, MVE’s arrangements would allow for up to 2,192 AUMs to be rested. These arrangements would provide flexibility during the construction and reclamation phases, support continued rest rotation management of the allotments, limit the need for temporary fencing, and allow for all other permittees with cattle AUMs to use their active AUMs in their permitted allotments with no reductions due to project activities. Each allotment would continue to be managed under a rest rotation system with details coordinated between the BLM and the grazing permittees. See the Grazing Coordination Plan (Appendix S of MVE [2023]) for additional details regarding the number of AUMs available per pasture for the Star Lake and Sid Butte allotments during the project subphases and phases. Grazing in the Camp I allotment, where an estimated 2.2% of the allotment acreage could be affected, would be scheduled to avoid conflict with construction and decommissioning. MVE would continue to work with individual permittees should a need for additional feed sources arise during project implementation. This could include range forage within the analysis area or at other locations, private ground forage operations, feedlot space, or other commercial arrangements. As coordination with the grazing permittees continues, mitigation measures would be refined; the Grazing Coordination Plan would be finalized before project construction.

Decommissioning (estimated at up to 2 years) at the end of project operation would include removing infrastructure built during construction and used during operation, including operation and maintenance buildings and substations (see Appendix L of MVE [2023]). During decommissioning, the same areas restricted from livestock grazing by temporary fencing during construction would be restricted again.

Since construction and decommissioning would have the same impacted areas, they are shown in a single table (Table 3.9-3). The table identifies the acres and percentage of each allotment that would be affected during project construction and decommissioning under the action alternatives. The acreage calculations are provided for all action alternatives for the purposes of impacts comparison. Because of its largest project footprint, Alternative B would affect the most allotments (eight) and the most acres overall during construction and decommissioning. The larger affected acreage in the Camp I allotment under Alternatives C through E and the Preferred Alternative (up to 2.6% of the allotment affected) is due to the larger proposed point of interconnect at the Midpoint Substation under those alternatives.

Allotments with acreage affected (see Table 3.9-3) during project construction and decommissioning are expressed in reduced forage availability (using AUMs) in Table 3.9-4. For construction and decommissioning, Alternative D would have the least forage reduction, and Alternative B would have the most. During construction, because of the alternate agreements and Grazing Coordination Plan that would be finalized before project construction, this affected forage availability would be offset, and there would be no net impacts to livestock forage availability from construction. With use of temporary fences during construction and decommissioning and additional water sources, grazing patterns and use across the affected allotments could change. These changes would be greatest where the proportions of affected allotments are estimated to be greatest, for example in the Star Lake and Sid Butte allotments; the duration of this change is estimated at up to 2 years. These changes in grazing pattern are unlikely under the other project phases (operation, final reclamation, and post-project). Livestock stress could occur where alternate feed sources involve moving livestock to grazing units they are unfamiliar with. This stress could temporarily impact health and weight gain while the livestock acclimate (see Section 3.9.2 [Physiological Effects to Livestock]). Active AUMs could be temporarily reduced by the AUMs shown in Table 3.9-4 during decommissioning to maintain current stocking rates and maintain vegetation communities and annual forage production.

Table 3.9-3. Affected Allotment Acreage during Construction and Decommissioning

Allotment Name	Alternative B Acres Affected (% of allotment)	Alternative C Acres Affected (% of allotment)	Alternative D Acres Affected (% of allotment)	Alternative E Acres Affected (% of allotment)	Preferred Alternative Acres Affected (% of allotment)
Camp I	263 (2.2%)	315 (2.6%)	315 (2.6%)	315 (2.6%)	315 (2.6%)
Flat Top	2 (1.5%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	3 (0.2%)	3 (0.2%)	3 (0.2%)	0 (0%)	0 (0%)
North Milner	831 (3.0%)	79 (0.3%)	79 (0.3%)	63 (0.2%)	63 (0.2%)
Sid Butte	15,543 (34.9%)	15,543 (34.9%)	1,715 (3.9%)	15,543 (34.9%)	12,124 (27.2%)
South Milner	18 (0.2%)	18 (0.2%)	18 (0.2%)	0 (0%)	0 (0%)
Star Lake	4,913 (5.0%)	4,068 (4.1%)	4,189 (4.3%)	2,517 (2.6%)	2,334 (2.4%)
North Subphase	1,793	2,034	2,095	2,517	1,577
South Subphase	1,557	2,034	2,095	–	757
West Subphase	1,562	–	–	–	–
Wildhorse	453 (0.2%)	3 (< 0.1%)	0 (0%)	3 (< 0.1%)	3 (< 0.1%)

Table 3.9-4. Affected Forage Availability (using animal unit months) during Construction and Decommissioning

Allotment Name	Alternative B Affected AUMs	Alternative C Affected AUMs	Alternative D Affected AUMs	Alternative E Affected AUMs	Preferred Alternative Affected AUMs
Camp I	44 (2.2%)	53 (2.6%)	53 (2.6%)	53 (2.6%)	53 (2.6%)
Flat Top	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	1 (0.2%)	1 (0.2%)	1 (0.2%)	0 (0%)	0 (0%)
North Milner	140 (3.0%)	13 (0.3%)	13 (0.3%)	11 (0.2%)	11 (0.2%)
Sid Butte	2,443 (34.9%)	2,445 (34.9%)	270 (3.9%)	2,445 (34.9%)	1,905 (27.2%)
South Milner	3 (0.2%)	3 (0.2%)	3 (0.2%)	0 (0%)	0 (0%)
Star Lake	890 (5.0%)	737 (4.1%)	758 (4.3%)	456 (2.6%)	423 (2.4%)
Wildhorse	53 (0.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	**3,572**	**3,249**	**1,097**	**2,962**	**2,391**

Project noise could result in reduced forage availability if livestock avoid an area due to noise; however, as discussed in Section 3.9.2, noise would only physiologically impact livestock within 50 feet of transformers. With no physiological effect in areas more than 50 feet of transformers, there would be no reason for livestock to avoid any areas not within 50 feet of transformers. However, if there are noise impacts to use of forage in an area, they would not be quantifiable due to the variability of how livestock may react to noise, livestock social and grazing dynamics, availability of the forage at these locations, and active construction progression, as noted in MVE [2023] Section 2.3. An increase in weed and nonnative species spread from the increase in vehicle traffic, equipment use, and ground disturbance from construction and operation activities could lead to a decrease in available forage as weed and nonnative species replace desirable species. Applicant-committed measures to address weed concerns (measures 8 and 100 through 108 in EIS Appendix 4) would be implemented and reduce the potential for the introduction and spread of weed and nonnative species (see Appendix R of MVE [2023]). Additional applicant-committed measures (163) or mitigation measures required by BLM policy (P and Q in EIS Appendix 4) would require temporarily disturbed areas to be reclaimed after construction, which would further minimize long-term forage reductions. Wildfire risk could increase, as noted in Section 3.7.1 (Wildfire Ignition, Spread, Response, and Suppression). Impacts to forage from wildfire would be variable, both in potential number of fires, burn pattern, and intensity. During construction and decommissioning, areas would have portions of their vegetative cover removed, which would reduce fuel loading and wildfire risk.

MVE has incorporated multiple applicant-committed measures (see EIS Appendix 4) that would be implemented to reduce potential impacts to livestock management, including the Grazing Coordination Plan (see measure 48 in EIS Appendix 4 and Appendix S of MVE [2023]). Limiting the disturbed areas and use of access roads to only those necessary for the project through measures 1, 2, 4, and 37, and avoiding activities when the soil is too wet (measure 135), would result in fewer affected AUMs. Through implementation of personnel carpooling, speed limits, temporary fencing, and MVE's commitment to repair impacted roads, measures 31 through 33, 39, 40, and 42 through 45 would reduce potential impacts to livestock grazing from project-related traffic. Measures 46 and 47 would reduce impacts to livestock watering throughout the project phases. See also the discussion of potential physiological effects to livestock in Section 3.9.2.

Operation and Final Reclamation

During both operation (30 years) and final reclamation (estimated at up to 2 years), the infrastructure disturbance areas would not provide forage for livestock grazing. The operation footprint is within the infrastructure disturbance areas; these are the same areas that would require final reclamation following project decommissioning. The Sid Butte allotment would have one laydown and staging yard. Two of three operation and maintenance buildings and two laydown and staging yards would be in the Star Lake allotment. The third building would not be located in a livestock grazing allotment. Final reclamation revegetation would be completed using BLM-approved seed mixes and approaches following the Reclamation Plan (see Appendix E of MVE [2023] and EIS Appendix 4). Based on the BLM's previous seeding efforts after wildfires, it is estimated that revegetation of livestock forage would be successful within 2 years, but could take up to 5 years. Following reclamation monitoring, the BLM would evaluate and direct MVE to implement further reclamation activities if needed.

Operation and final reclamation would impact the same acreages (the infrastructure disturbance areas) and are therefore being shown in a single table (Table 3.9-5). The table identifies the acres and percentage of each allotment that would be affected during operation and final reclamation of the project under each action alternative. The acreage calculations are provided for all action alternatives for the purposes of impact comparison.

Allotments with acreage affected during project operation and final reclamation (see Table 3.9-5) are expressed in reduced forage availability (using AUMs) in Table 3.9-6. For operation and final reclamation, the lowest forage reduction would be from the Preferred Alternative, and the highest forage reduction would be from Alternative B. As shown in Table 3.9-6, the reduced forage availability (using AUMs) amounts to 1.3% or less of the active AUMs across all action alternatives. Since the average historical actual use within the Sid Butte and Star Lake allotments has been 68% and 94% (respectively) and the average historical utilization has been 46% for both allotments, there is sufficient forage availability to accommodate this estimated 1.3% or less reduction (see EIS Appendix 12). Additionally, fire rehabilitation seedings have increased forage production across the analysis area, such that there is additional abundant forage available above what is currently permitted. There is more forage available than what is currently in use and beyond what would be affected during operation and final reclamation.

Table 3.9-5. Affected Allotment Acreage during Operation and Final Reclamation

Allotment Name	Alternative B Acres Affected (% of allotment)	Alternative C Acres Affected (% of allotment)	Alternative D Acres Affected (% of allotment)	Alternative E Acres Affected (% of allotment)	Preferred Alternative Acres Affected (% of allotment)
Camp I	68 (0.6%)	82 (0.7%)	82 (0.7%)	82 (0.7%)	82 (0.7%)
Flat Top	1 (0.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	1 (< 0.1%)	1 (< 0.1%)	1 (< 0.1%)	0 (0%)	0 (0%)
North Milner	216 (0.8%)	21 (0.1%)	21 (0.1%)	17 (0.1%)	17 (0.1%)
Sid Butte	487 (1.1%)	487 (1.1%)	32 (0.1%)	487 (1.1%)	380 (0.9%)
South Milner	5 (< 0.1%)	5 (< 0.1%)	5 (< 0.1%)	0 (0%)	0 (0%)
Star Lake	1,278 (1.3%)	1,061 (1.1%)	1,093 (1.1%)	688 (0.7%)	516 (0.5%)
Wildhorse	118 (< 0.1%)	1 (< 0.1%)	0 (0%)	1 (< 0.1%)	1 (< 0.1%)

Table 3.9-6. Affected Forage Availability (using animal unit months) during Operation and Final Reclamation

Allotment Name	Alternative B Affected AUMs	Alternative C Affected AUMs	Alternative D Affected AUMs	Alternative E Affected AUMs	Preferred Alternative Affected AUMs
Camp I	11 (0.6%)	14 (0.7%)	14 (0.7%)	14 (0.7%)	14 (0.7%)
Flat Top	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
North Milner	36 (0.8%)	4 (0.1%)	4 (0.1%)	3 (0.1%)	3 (0.1%)
Sid Butte	77 (1.1%)	77 (1.1%)	5 (0.1%)	77 (1.1%)	60 (0.9%)
South Milner	1 (< 0.1%)	1 (< 0.1%)	1 (< 0.1%)	0 (0%)	0 (0%)
Star Lake	231 (1.3%)	192 (1.1%)	198 (1.1%)	125 (0.7%)	93 (0.5%)
Wildhorse	14 (< 0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	**370**	**287**	**221**	**218**	**170**

Post-project

The BLM may choose to leave access roads in place after the project is complete. These roads include all new access roads and any expansion of the existing roads footprint. If acres for the access roads are not reclaimed, they would be permanently removed from forage production for livestock grazing. Additionally, areas of limited reclamation potential, as discussed in Section 3.13.1.1, impacted by project construction would not regain forage production and therefore are counted as permanent post-project acreage loss. Table 3.9-7 identifies the acres that could be removed from forage production post-project from access roads and areas of limited reclamation potential.

Allotments with permanently affected acreage post-project (see Table 3.9-7) are expressed as reduced forage availability (using AUMs) in Table 3.9-8 (using AUMs). Post-project, the lowest forage reduction in the Star Lake allotment would be from the Preferred Alternative, and the highest forage reduction would be from Alternative B. The lowest reduction in the Sid Butte allotment would be from Alternative D. As shown in Table 3.9-8, the permanently reduced forage availability (using AUMs) amounts to less than 1% of the active AUMs in any allotments across all action alternatives. Since the average historical actual use within the Sid Butte and Star Lake allotments has been 68% and 94% (respectively) and the average historical utilization has been 46% for both allotments, there is sufficient forage availability to accommodate this estimated less than 1% reduction (see EIS Appendix 12). Permittees would not be compensated for these minor permanent reductions in forage availability from the acres affected by the project. Additionally, fire rehabilitation seedings have increased forage production across the analysis area, such that there is additional abundant forage available above what is currently permitted. There is more forage available than what is currently in use and beyond what would be permanently affected. Existing livestock grazing permits would not be modified through this EIS. If part of the action alternatives would require modifications to grazing permits, it would be addressed in a subsequent NEPA analysis and permit actions, in accordance with CFR Subpart 4120, Grazing Regulations.

Table 3.9-7. Post-Project Affected Allotment Acreage

Allotment Name	Alternative B Acres Affected (% of allotment)	Alternative C Acres Affected (% of allotment)	Alternative D Acres Affected (% of allotment)	Alternative E Acres Affected (% of allotment)	Preferred Alternative Acres Affected (% of allotment)
Camp I	30 (0.2%)	35 (0.3%)	35 (0.3%)	35 (0.3%)	35 (0.3%)
Flat Top	1 (0.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
North Milner	108 (0.4%)	6 (< 0.1%)	6 (< 0.1%)	0 (0%)	0 (0%)
Sid Butte	271 (0.6%)	271 (0.6%)	21.35 (< 0.1%)	271 (0.6%)	211 (0.5%)
South Milner	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Star Lake	823 (0.8%)	661 (0.7%)	691 (0.7%)	454 (0.5%)	355 (0.4%)
Wildhorse	72 (< 0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Table 3.9-8. Reduced Post-Project Forage Availability (Using Animal Unit Months)

Allotment Name	Alternative B Reduced AUMs	Alternative C Reduced AUMs	Alternative D Reduced AUMs	Alternative E Reduced AUMs	Preferred Alternative Reduced AUMs
Camp I	5 (0.2%)	6 (0.3%)	6 (0.3%)	6 (0.3%)	6 (0.3%)
Flat Top	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Hunt	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
North Milner	18 (0.4%)	1 (< 0.1%)	1 (< 0.1%)	0 (0%)	0 (0%)
Sid Butte	43 (0.6%)	43 (0.6%)	3 (< 0.1%)	43 (0.6%)	33 (0.5%)
South Milner	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Star Lake	149 (0.8%)	120 (0.7%)	125 (0.7%)	82 (0.5%)	64 (0.4%)
Wildhorse	8 (< 0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total	**223**	**169**	**135**	**131**	**103**

Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App4-4 in EIS Appendix 4) to minimize impacts to livestock grazing under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for grazing allotments are summarized in Table 3.9-9 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.9-9. Mitigation for Grazing Allotments

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1–2	P	nnn–ppp
4	Q	–
8	–	–
31–33	–	–
37	–	–
39–40	–	–
42–47	–	–
100–108	–	–
135	–	–
163	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of these additional measures would further reduce the potential for weed and nonnative species to replace desirable species in the analysis area, and available forage would not be decreased to the same extent as under Alternative B without inclusion of these measures. With these measures, the potential for weed introduction and spread would be reduced from under Alternative B without these additional measures.

3.9.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, seven allotments would be impacted by the project; however, because of the low acreage impacts in the Hunt and Wildhorse allotments, there would only be reduced forage availability in five allotments. Alternative C impacts are similar to Alternative B, except that the Flat Top, Hunt, and Wildhorse allotments would not have any change in forage availability under this alternative. Throughout the project, less acres and forage availability would be affected in the North Milner allotment and more acres and forage availability would be affected in the Camp I allotment under Alternative C than under Alternative B. The impacts to the Sid Butte allotment would be the same, and there would be less acres affected in the Star Lake allotment. Tables 3.9-3 through 3.9.8 identify the affected acres and reduced forage (using AUMs) for livestock grazing for Alternative C under the project phases. Therefore, although grazing permittees and the broader grazing community would still experience the same types of socioeconomic effects as described under Alternative B, the magnitude of impacts would be reduced in comparison. The measures described above for Alternative B with Additional Measures would be included in Alternative C, reducing the potential for weed introduction and spread.

3.9.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Under Alternative D, six allotments would be impacted by the project; however, because of the low acreage impacts in the Hunt allotment, there would only be reduced forage availability in five allotments. Alternative D impacts are similar to Alternative B, except that the Flat Top, Hunt, and Wildhorse allotments would not have any change in forage availability under this alternative. Tables 3.9-3 through 3.9-8 identify the affected acres and reduced forage (using AUMs) for livestock grazing for Alternative D. The acreage of the Sid Butte allotment (and available forage) affected by the project under Alternative D would be the least of all action alternatives, and there would be no laydown or staging yards within the allotment. Grazing permittees and the broader grazing community would still experience the same types of socioeconomic effects as described under Alternative C. The applicant-committed measures, required mitigation, and additional measures under Alternative D would be the same as for Alternative C.

3.9.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Under Alternative E, five allotments would be impacted by the project; however, because of the low acreage impacts in the Wildhorse allotment there would only be reduced forage availability in four allotments. Alternative E impacts would be similar to Alternative B, except that the Flat Top, Hunt, South Milner, and Wildhorse allotments would not have any changes in forage availability under this alternative. Tables 3.9-3 through 3.9-8 identify the affected acres and reduced forage (using AUMs) for livestock grazing for Alternative E. The acreage of the Star Lake allotment (and available forage) affected by the project under Alternative E would be the second least of all action alternatives. Grazing permittees and the broader grazing community would still experience the same types of socioeconomic effects as described under Alternative C. The applicant-committed measures, required mitigation, and additional measures under Alternative E would be the same as for Alternative C.

3.9.1.2.6 PREFERRED ALTERNATIVE

Under the Preferred Alternative, five allotments would be impacted by the project; however, because of the low acreage impacts in the Wildhorse allotment, there would only be reduced forage availability in four allotments, similar to Alternative E. Tables 3.9-3 through 3.9-8 identify the affected acres and reduced forage (using AUMs) for livestock grazing for the Preferred Alternative. The acreage of the Star Lake allotment (and available forage) affected by the project under the Preferred Alternative would be the least of all action alternatives. Grazing permittees and the broader grazing community would still experience the same types of socioeconomic effects as described under Alternative C. The applicant-committed measures, required mitigation, and additional measures under the Preferred Alternative would be the same as for Alternative C.

Similar to Alternatives B, C, D, and E, the Preferred Alternative would include construction subphasing to ensure work area disturbance would not occur across all siting corridors simultaneously. As shown in Figure 3.9-1, the Preferred Alternative subphases would differ from Alternatives B, C, D, and E; the subphases include North and South Star Lake and Sid Butte.

3.9.1.2.7 CUMULATIVE IMPACTS

The trend for increased renewable energy development in the analysis area and the potential additive or synergistic effects of other renewable energy projects (of similar size and scale) in combination with the project would compound the AUMs affected by surface disturbance, vegetation removal, temporary fencing, and in the case of the proposed solar facilities, possible exclusion from currently grazed portions of the analysis area (Figure 3.9-2). If authorized by the BLM, the three proposed solar facilities' perimeter fences combined could result in up to another 9,900 acres excluded from livestock grazing within these three allotments: Camp I, North Milner, and Star Lake. The proportion of cumulatively affected allotment acreages during operation of the project is included in Table 3.9-10. When combined with Alternative B, the Taurus Wind Project (assumed for this analysis to be a similar size and scale to the Lava Ridge Wind Project, though a complete ROW application has not yet been received by BLM) would result in an estimated additional 1% to 2% affected AUMs for the Camp I permittees. The other renewable energy developers would coordinate with the grazing permittees and the BLM to develop grazing coordination plans, similar to the Lava Ridge Wind Project (see Appendix S of MVE [2023]).

The cumulative impact of future trends and actions on the broader grazing economy and community could also be substantial if the overall community experiences a period of economic uncertainty and the social and economic structures within communities begin to break down. The magnitude of impacts would depend on how widespread the AUM reductions are at any point in time. If a critical number of grazing operations begin competing for alternate sources of feed, including private rangeland or pastures, hay, and feedlot capacity, the compounding demands placed on community resources could cause ripple effects within the local grazing economy. Prices for alternate feed could increase while the market for excess livestock could be depressed, leading to reduced market prices for livestock. Social structures could also suffer from community stress and reduced social cohesion.

Since Alternative B would have the most ground disturbance of the action alternatives, it would have the most cumulative impacts when combined with existing and future trends and actions. The Preferred Alternative would have the least ground disturbance, and thus would have the least cumulative impacts of the action alternatives.

Table 3.9-10. Cumulative Affected Allotment Acreage during Project Operation, when Combined with Other Reasonably Foreseeable Renewable Energy Projects

Allotment Name	Total Allotment Acres	Alternative B Cumulative Acres Affected during Operation (% of allotment)	Alternative C Cumulative Acres Affected during Operation (% of allotment)	Alternative D Cumulative Acres Affected during Operation (% of allotment)	Alternative E Cumulative Acres Affected during Operation (% of allotment)	Preferred Alternative Cumulative Acres Affected during Operation (% of allotment)
Camp I	12,020	3,557 (29.6%)	3,571 (29.7%)	3,571 (29.7%)	3,571 (29.7%)	3,571 (29.7%)
North Milner	27,984	3,444 (12.3%)	3,249 (11.6%)	3,249 (11.6%)	3,245 (11.6%)	3,245 (11.6%)
Star Lake	98,143	4,489 (4.6%)	4,271 (4.4%)	4,303 (4.4%)	3,898 (4.0%)	3,727 (3.8%)
Total	**–**	**11,490**	**11,091**	**11,123**	**10,715**	**10,543**

3.9.1.3 Significance Determination

Under all action alternatives, there would not be a significant loss of forage availability during construction, operation, or decommissioning leading to a reduction in permitted grazing. Each action alternative would result in disturbance to vegetation and would reduce the total amount of forage available within grazing allotments. However, the total reduction in forage availability is small relative to the total forage available within each allotment, and information from historical actual use and utilization within the affected allotments indicates the available forage would continue to support the level of grazing as currently authorized. Through the implementation of MVE’s Grazing Coordination Plan (Appendix S in MVE [2023]), the phased construction and agreements would allow for voluntary non-use of AUMs during the construction and reclamation phases.

There would not be significant changes to how grazing is conducted in the allotments. Under Alternatives C–E and the Preferred Alternative, the construction schedule, the smaller project footprint, and MVE’s agreements with permittees would result in more flexibility to rest or use different pastures while vegetation is re-established. Under Alternative B, changes to grazing operations would occur during construction and up to 2 years after interim reclamation is completed (Appendix S in MVE [2023]). Grazing operations would return to preconstruction methods once vegetation is re-established.

3.9.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

An irretrievable commitment of grazing resources and effects to the local grazing economy would occur, mostly during construction and decommissioning, with minor irretrievable effects over the life of the project. Disturbance to vegetation within each grazing allotment would reduce the total amount of forage available. These effects would persist throughout operation and final reclamation and until disturbed areas are successfully revegetated to provide adequate livestock forage, estimated at 34 to 41 years.

Post-project (i.e., after final reclamation is complete), some areas could have permanently reduced forage production (irreversible commitment) for livestock grazing because they would not be reclaimed (e.g., access roads) or because they have limited reclamation potential (less than 1% for any allotment under any action alternative).

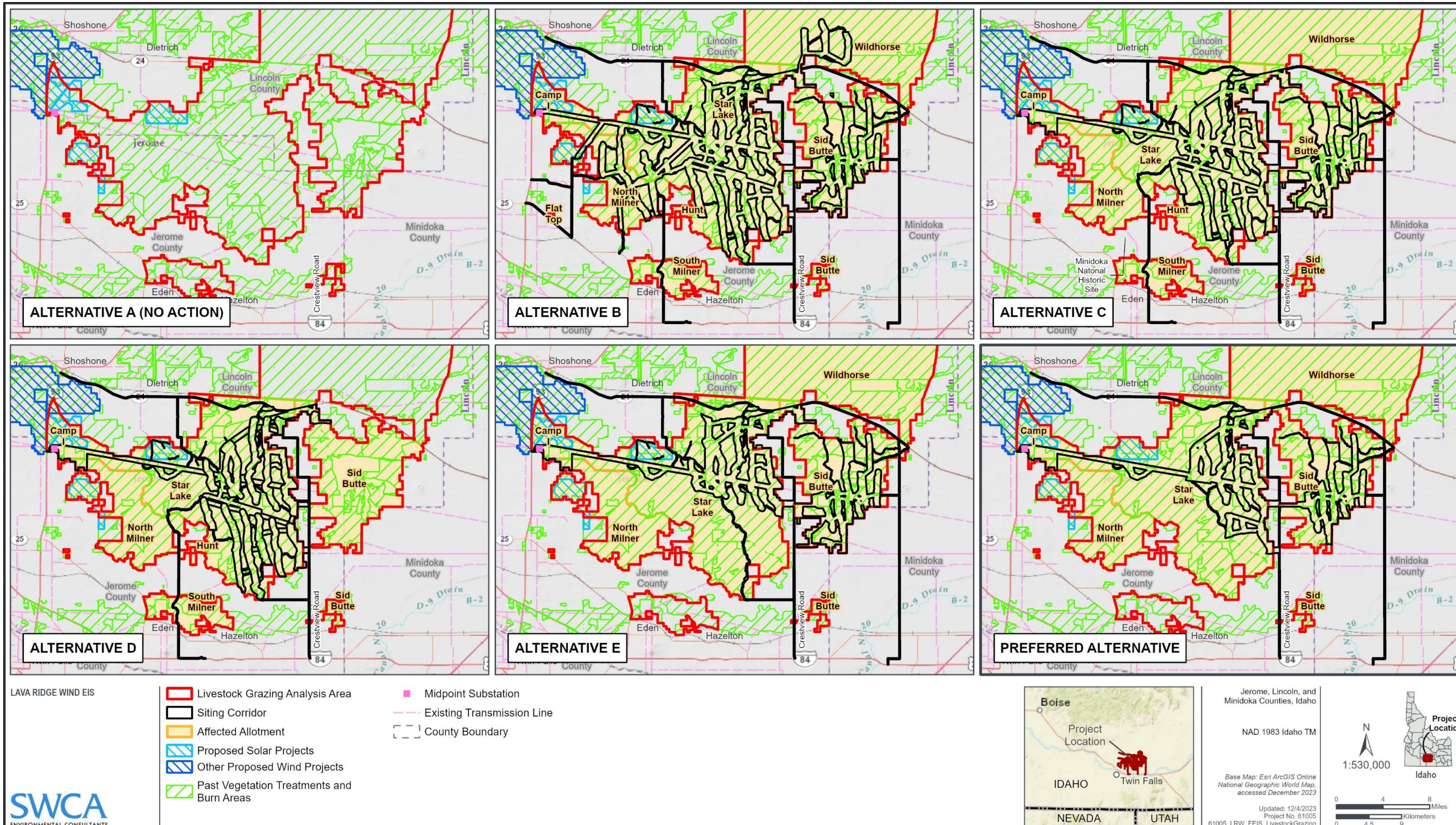

Figure 3.9-2. Livestock grazing analysis area and cumulatively affected allotments per action alternative.

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3.9.2 Physiological Effects to Livestock

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.9-11.

Table 3.9-11. Analysis Approach for Physiological Effects to Livestock

Issue Analyzed in Detail	How would turbine operation, vehicle traffic, and increased human presence from the project physiologically affect livestock?
Associated Issues Analyzed in Brief	AIB-16: How would the project affect the functionality of range improvements during the allotment grazing period?
Analysis Area	Same as grazing allotments and range socioeconomic (see Section 3.9.1).
Indicators	Qualitative analysis/discussion based on existing literature.
Impacts Duration	Same as grazing allotments and range socioeconomic (see Section 3.9.1).
Data Sources	Allotment management plans for each allotment. BLM allotment permit and AUM information. Project noise technical report (SWCA 2022). Best available science published literature.
Assumptions or Approach	Based on the data source review, there are no conclusive data for potential physiological effects to free-ranging beef cattle and sheep to identify a quantitative measure for effects analysis; therefore, the analysis presents a qualitative discussion based on the best available science.

3.9.2.1 Affected Environment

The livestock grazing permittees are permitted to graze cattle and sheep in the allotments, including calving and lambing activities. Livestock are managed within pastures (smaller management units) in the allotments during specific seasons. Existing infrastructure in the analysis area that could be stress vectors for livestock include linear transportation, motorized access, and electrical infrastructure (see EIS Section 3.1.1 [Existing and Future Trends and Actions]).

3.9.2.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions will influence livestock grazing as described in Section 3.9.1.1.1 (Existing and Future Trends and Actions). These existing and future trends and actions have affected and will continue to affect 345,456 acres (79%) of the 436,801-acre analysis area.

3.9.2.2 Impacts

An in-depth review was conducted on the effects of increased anthropogenic stress catalysts to cattle and sheep, specifically associated with shadow flicker, electromagnetism, noise, vehicle traffic, and a general increase in human presence.

No published literature directly addressing shadow flicker and effects to livestock was identified. Helldin et al. (2012) does note that there were no documented visual impacts to terrestrial mammals from wind farms; however, there could be some cumulative effects from multiple wind projects adjacent to each other (size and number of wind projects leading to cumulative effects was not defined).

A review of published literature on EMF includes a variety of findings based on specific research. Several studies (Appleman and Gustafson 1985; Broucek et al. 2003; Burchard et al. 1998, 1999; Burda et al. 2009; Reinemann et al. 2005) found behavioral and physiological effects to livestock after exposure to

EMF. Effects included avoidance behavior in the first days after exposure; chemical responses in blood plasma and cerebrospinal fluid; changes in milk lactation following exposure; slight reduction in feed intake, water intake, and milk production in the first days after exposure at the highest tested level; and general alignment on earth during EMF exposure. The scope and methods for these studies show that possible measurable effects may not be directly applicable to the Lava Ridge Wind Project infrastructure and potential EMF exposure. Additional literature indicates that there is no measurable effect of EMF exposure to livestock (Algers and Huntgren 1987; Amstutz and Miller 1980; Angell et al. 1990; Burchard et al. 1998; Burchard et al. 2007). Three studies specifically researched livestock grazing under high-voltage transmission lines and concluded that the animals experienced no health problems associated with exposure over long periods (Amstutz and Miller 1980; Algers and Huntgren 1987; Angell et al. 1990). Additional studies, which exposed pregnant livestock to stray voltage and electromagnetic fields in control groups, observed slight behavioral stress responses but not of a magnitude that would be attributed to a health hazard. One study focused on the effects to livestock from stray voltage applied to the water trough and found that the exposure could be a mild stressor immediately after exposure, but no impairment or impact on production was found (Rigalma et al. 2010).

Information about vehicle traffic impacts to livestock was confined to vehicle transport scenarios with no applicable data on vehicle traffic impacts to livestock adjacent to roads.

No published research on noise effects to livestock specifically from wind turbines or roads was identified; the only livestock research in a recent synthesis article on wind turbine noise research was for domestic geese (Hansen and Hansen 2020). However, several papers looked at impacts from noise under either intensely managed livestock operations (primarily confined operations) or for similar types of noise disturbances. Livestock were noted as generally acclimatizing to noise, particularly those at less than 100 dB (Ames and Arehart 1972; Arehart and Ames 1972; Bond and Winchester 1963; Harbers et al. 1975). Some studies show some effects to livestock on a short-term basis within a range of 85 to 90 dB or greater; however, these were in confined management areas or buildings (Ames 1978; Broucek 2014 [also identified that farm animals adapt to noise]). Krausman et al. (1998) and Helldin et al. (2012) noted no adverse effects from noise to livestock. Waynert et al. (1999) studied beef cattle response to human voice and metal-on-metal clanging noise in a working chute in a barn (study treatment), with the addition of response monitoring in outdoor pens during pretreatment and posttreatment periods. In Waynert et al. (1999), the test subjects (beef cattle heifers) had elevated heart rates and moved more during the testing period than their counterparts who were not exposed to treatment sounds; the test subjects became habituated with lowered heart rates after 5 days, but increased movement did not decrease during that time frame. Hauser and Wechsler (2013) measured the reaction of sheep feeding in a barn to machine guns firing at different distances from the barn. Sheep did not react to machine guns at 1,076 feet at an average sound level of 98.8 dB, they temporarily huddled at 262 feet at an average sound level of 109.2 dB, and they had significant reactions at 52 feet with an average sound level of 127.8 dB. The authors concluded the tolerable maximum noise exposure for the sheep was below 120 dB (Hauser and Wechsler 2013).

The turbines' total sound power level would be 124.6 dB, with the acoustic center of that noise at approximately 321 feet aboveground. At that height, the sound would lessen at ground level to 73.9 dB from the turbine hub and 85.3 dB from the blade. The sound would further dissipate with distance from the turbine. Similarly, the transformers' highest total sound power would be 109.5 dB, with an acoustic center of 6.56 feet aboveground. At 50 feet from a transformer, the estimated sound power level would be 74.8 dB (SWCA 2022).

Regarding the potential for increased human presence to physiologically affect livestock, no direct research data were found on impacts of recreation to livestock. Some papers and agency documents discuss recreation and livestock conflicts, but physiological effects are not identified. Non-motorized activities have more evidence for causing impacts (e.g., stress) than motorized activities in the data reviewed by Larson et al. (2016), and large vertebrates were less likely to have negative impacts. Fernandez-Novo et al. (2020) generally discuss how stress can negatively affect livestock health; however, the analysis's research is primarily geared toward management stress (handling, social environment, weaning, nutrition, and thermal). In a rangeland grazing scenario, there is potential for stress from social hierarchy as herds are moved to grazing units they are unfamiliar with or herds move away from areas with increased anthropogenic activity because animals would need to regroup following these changes; however, there is no current information available for quantifying that sort of stress potential.

3.9.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and physiological effects to livestock would only be caused by existing and future trends and actions.

3.9.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Under Alternative B, impacts from noise, including noise from project construction and operation and recreational vehicles, could occur in eight allotments (see Table 3.9-2 for allotments). Based on best available scientific information, other physiological effects to livestock are unlikely; however, many of these effects have not been studied on open-area-ranging livestock in a modern study.

Active construction would not occur on all areas at once; rather, it would be a progression of active construction moving from one proposed infrastructure site (turbine pad, collector line ROW, access road, etc.) to the next as construction is completed at each. This may result in noise source vectors coming from several locations as construction is completed and equipment is moved to the next construction area and multiple construction teams work near each other; noise coming from several sources could be cumulative in some areas. To lessen the noise impact from all construction equipment, it would have sound-control devices no less effective than those provided on the original equipment; the equipment would be adequately muffled and maintained (see applicant-committed measure 95 in Table App4-2 in EIS Appendix 4). Since livestock do not stay in a static location and the active construction would be moving, it is not possible to determine cumulative noise levels at any given point. Estimated construction noise levels in grazing allotments at a distance of 50 feet or more from project activities, would be within the threshold of known information on livestock noise tolerance and adaptability. The allotments have more open space than areas used in the few studies on livestock noise tolerance. Project noise would also lessen as livestock move away from the construction and operation areas. MVE would coordinate with the grazing permittees to avoid obstructing livestock movement so that livestock could move away from noise stressors and maintain access to forage and water. Decommissioning impacts would be the same as discussed for construction.

Areas of shallow bedrock may require blasting that could result in loud noise during the blast. Blasting would be conducted twice per day during construction following MVE's Blasting Plan (see Appendix I of MVE [2023]; see also applicant-committed measures 85, 87, 88, and 90 through 94 in Table App4-2 in EIS Appendix 4). Blasting noise at 50 feet would be 94 dBA. The fence buffers around construction areas would be at least 75 feet. The sound dispersal at 75 feet would be near or below the tolerance and adaptability level for livestock. As described in MVE (2023), blasting would be avoided within 1,000 feet of waterbodies and wells (measure 90 in Table App4-2 in EIS Appendix 4). The blasting buffer around waterbodies and wells would reduce sudden noise impacts to livestock watering sites.

The turbines total sound power level would be 124.6 dBA, with the acoustic center of that noise at approximately 321 feet aboveground. At that height, the sound would lessen at ground level to 73.9 dBA from the turbine hub and 85.3 dBA from the blade. The turbine and blade noise at ground level would be within the threshold of known information on livestock noise tolerance and adaptability. Similarly, the transformers highest total sound power would be 109.5 dBA, with an acoustic center of 6.56 feet aboveground. At 50 feet from a transformer, the estimated sound power level would be 74.8 dBA, which is below the tolerance and adaptability level detailed in the known information on livestock noise tolerance. Livestock would potentially not tolerate the sound level directly adjacent to the transformer or cumulative sound in some areas. However, the sound would be within acceptable tolerances and adaptability by moving a short distance away. If transformers are placed directly adjacent to water sources or if cumulative sound exceeds livestock noise tolerance in these areas, then livestock avoidance could lead to a decline in livestock health due to lack of water; similarly, forage use in areas directly adjacent to transformers and where cumulative sound exceeds livestock noise tolerance could decline, leading to an effective reduction in forage access. Lambing and calving areas with high cumulative noise and activity could result in stress level increases in the lambs and calves.

The allotments could see an increase in access from operation and recreational traffic because of the new and improved roads. If traffic or sharp noises from construction were to startle or displace livestock herds due to the noise or vehicle traffic, there is potential for livestock stress as the herd regroups, particularly in locations where new roads are being used. Applicant-committed measure 33 and mitigation measure N required by BLM policy (see EIS Appendix 4), which establish speed limits on BLM roads and require project personnel to adhere to them, would help reduce the potential for herd displacement and deaths from livestock-vehicle collisions. MVE's Dust and Emissions Control Plan would reduce livestock exposure to project dust and emissions (see Appendix O of MVE [2023]; measure 113 in Table App4-2).

Physiological effects to livestock are summarized in Table 3.9-12.

Table 3.9-12. Summary of Physiological Impacts to Livestock from the Project

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Physiological effects to livestock	In eight allotments, minimal noise impacts if project activities occur within 50 feet of livestock	In seven allotments, minimal noise impacts if project activities occur within 50 feet of livestock	In six allotments, minimal noise impacts if project activities occur within 50 feet of livestock	In five allotments, minimal noise impacts if project activities occur within 50 feet of livestock	In five allotments, minimal noise impacts if project activities occur within 50 feet of livestock

Alternative B with Additional Measures

No additional project-specific mitigation measures related to physiological effects to livestock would be required by BLM for Alternative B. Other mitigation measures for physiological effects to livestock are summarized in Table 3.9-13 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.9-13. Mitigation for Physiological Effects to Livestock

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
33	N	–
85	–	–

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
87–88	–	–
90–95	–	–
113	–	–

Note: All measures are detailed in EIS Appendix 4.

3.9.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, the impacts would be the same as Alternative B, except that only seven allotments would have impacts from noise, including noise from project operation and recreational vehicles. The Flat Top allotment would not be impacted by Alternative C.

3.9.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Under Alternative D, the impacts would be the same as Alternative B, except that only six allotments would have impacts from noise, including noise from project operation and recreational vehicles. The Flat Top and Wildhorse allotments would not be impacted by Alternative D. Since there are so few siting corridors in the Sid Butte allotment under Alternative D, of all action alternatives, Alternative D would have the least physiological effects within the Sid Butte allotment.

3.9.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Under Alternative E, the impacts would be the same as Alternative B, except that only five allotments would have work area or infrastructure disturbance. The Flat Top, Hunt, and South Milner allotments would not be impacted by Alternative E.

3.9.2.2.6 PREFERRED ALTERNATIVE

Under the Preferred Alternative, the impacts would be the same as Alternative E, except this alternative would result in the fewest potential stressors to livestock because the least amount of acres of allotments would be affected. Within the Sid Butte and Star Lake allotments, there would be 22% and 6% less acres (respectively) affected compared to Alternative E, whereas the effects in the Camp I, North Milner, and Wildhorse allotments would be the same as Alternative E.

3.9.2.2.7 CUMULATIVE IMPACTS

Construction and operation of reasonably foreseeable electrical infrastructure, including wind and solar projects, could compound livestock physiological effects from noise in the analysis area. The intensity of impacts would vary depending on the proximity of planned actions to livestock. Since the Lava Ridge Wind Project construction and operation would not occur within 50 feet of the other projects, additive livestock physiological effects from noise are not anticipated, and the physiological effects to livestock would affect the same number of allotments per alternative as described above.

If new information becomes available regarding physiological effects to livestock from shadow flicker and electromagnetism, the BLM would work with MVE and the grazing permittees to amend the Grazing Coordination Plan (see Appendix S of MVE [2023]) to include minimization or mitigation measures.

3.9.2.3 Significance Determination

Under all action alternatives, potential adverse physiological effects to livestock would not be significant. Physiological impacts on livestock related to construction, operation, and decommissioning equipment noise and blasting are not anticipated given that livestock would not be within pastures during construction activities, and noise levels (except for areas within a 50 feet of a transformer) during the projects operation would be below tolerance levels for livestock.

3.9.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Irretrievable physiological impacts on livestock related to construction and decommissioning equipment noise and blasting are not anticipated. Although unlikely, there is also the potential for longer-term irretrievable physiological effects to livestock that do not move beyond 50 feet from transformers during project operation.

3.10 PALEONTOLOGICAL RESOURCES

3.10.1 Potential Disturbance of Unknown Fossils

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.10-1.

Table 3.10-1. Analysis Approach for Potential Disturbance of Unknown Fossils

Issue Analyzed in Detail	How would ground disturbance associated with the project physically affect unknown paleontological resources in areas with mapped Quaternary-age alluvial and lacustrine (or playa) deposits?
Associated Issues Analyzed in Brief	AIB-21: How would ground disturbance associated with the project physically affect known or unknown paleontological resources in areas with mapped igneous geology (basalt)? AIB-22: How would concrete foundations for turbines and other infrastructure affect access for scientific research to unknown paleontological resources in areas with Quaternary-age mapped geology? AIB-23: How would human access throughout the project affect the risk of looting or vandalism of known or unknown paleontological resources? AIB-24: How would ground disturbance at material source areas not yet determined (associated with project decommissioning and reclamation) physically affect known or unknown paleontological resources in areas with Quaternary-age mapped deposits?
Analysis Area	The areas of Quaternary-age alluvial and lacustrine (or playa) deposits in the siting corridors because project surface-disturbing activities could occur anywhere in these corridors.
Indicators	Acres of mapped Quaternary-age alluvial and lacustrine (or playa) deposits.
Impacts Duration	Since paleontological resources are non-renewable, the impacts duration would be the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Digital geologic maps at the highest scale available (published by the USGS and Idaho Geologic Survey)[11] and aerial imagery. Although the BLM Potential Fossil Yield Classification (PFYC) system typically provides the foundation for management of paleontological resources at a regional scale and provides the basis for analysis as projects and activities are planned or proposed by BLM resource programs or private projects, the geologic units mapped within the siting corridors are designated by the BLM as unknown or are unclassified. A project-specific pedestrian field survey of exposed geologic units can provide additional information for unclassified and unknown units, yet a project-specific survey was not conducted because there is a low potential for surface exposures. Aerial imagery of the siting corridors indicates that information obtained through a pedestrian field survey would likely be limited because the deposits of interest have low relief, are covered by vegetation, and in some cases covered in standing water. The magnitude of the paleontological potential of the Quaternary-age alluvial and lacustrine (or playa) deposits remains unknown because the units of interest are covered by younger sediments, vegetation, and/or water.
Assumptions or Approach	Potential effects to paleontological resources increase as more acres of geologic units with potential to contain scientifically significant resources are disturbed.

3.10.1.1 Affected Environment

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust, that are of paleontological interest and that provide information about the history of life on Earth. Paleontological resources are considered non-renewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Although all fossils offer scientific information, not all provide significant scientific information. Fossils are generally considered scientifically significant if they are unique, unusual, rare, diagnostically, or stratigraphically important, or

[11] BLM EISs typically evaluate the potential for project impacts using the BLM Potential Fossil Yield Classification (PFYC), which is correlated to mapped geological formations. The BLM Idaho PFYC for the Lava Ridge siting corridors is either unknown or not yet classified; therefore, the PFYC was not further used in this EIS analysis.

in any other way add to the knowledge in a specific area of science. The types of fossils in a specific area can generally be predicted before field survey, based on the age of the rock formations and depositional environment. Most fossils are found in sedimentary deposits.

The siting corridors cover approximately 84,051 acres in Lincoln, Jerome, and Minidoka Counties, Idaho, and cross 1,237 acres of Quaternary-age alluvial and lacustrine (or playa) deposits for which the magnitude of the paleontological potential is unknown (Ludington et al. 2007; Othberg et al. 2012). Mixed alluvial and lacustrine (playa) deposits are sometimes associated with existing water features, but this is not always the case. These Quaternary-age alluvial and lacustrine deposits are often mapped in a larger area than present-day water features. There are also existing water features such as modern playas and lakes (at least 148 additional acres; described in detail in Section 3.17 [Water and Wetland Resources]) without alluvial and lacustrine deposits underlying them. The remainder of the siting corridors crosses areas mapped as igneous (i.e., basalt) geologic units, and these areas were not analyzed in detail (see AIB-21 in EIS Appendix 3 and Knauss [2022]). No previously recorded localities are known from the Quaternary-age alluvial and lacustrine (or playa) deposits within the analysis area (Knauss 2022). Quaternary-age lacustrine (playa) and alluvial deposits in south-central Idaho contain scientifically important Pleistocene-age paleontological resources (e.g., fossils of fish, rodents, bison, mammoths, other mammals, invertebrates, and plants) on the ground surface and in the exposed subsurface. The mapped deposits within the siting corridors have not yet been directly correlated to deposits with known paleontological resources other than 507 acres of Bonneville Flood sand and gravel deposits (Ludington et al. 2007; Winterfeld and Rapp 2009). The remainder of the Quaternary-age alluvial and lacustrine (or playa) deposits in the siting corridors were deposited during heavy rain and rapid snow melt events in low areas, including between basalt flows, primarily during the Pleistocene and more rarely into recent times and are largely derived from erosion of glacial loess and the older Glenns Ferry Formation (Othberg et al. 2012).

3.10.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have influenced paleontological resources in the analysis area in various ways. Surface disturbance associated with past and planned transportation, electrical, or irrigation developments has increased the risk for the physical loss or damage of fossils and their contextual data. However, the likelihood of these effects depends on the proximity of proposed disturbances to paleontological resources. These existing and future trends and actions have affected or would affect slightly more than 23 acres (2%) of the 1,237 acres of Quaternary-age alluvial and lacustrine (or playa) deposits and a total of approximately 17 linear miles of existing roads (comprising 10.6 miles of paved and 6.4 miles of unpaved motorized roads).

3.10.1.2 Impacts

3.10.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and paleontological resources would only be affected by existing and future trends and actions.

3.10.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Although there are no known paleontological resources in the analysis area, important paleontological resources could be present in the subsurface. Alternative B construction activities in work areas and infrastructure areas, including vegetation removal, excavation and grading, and geotechnical excavation and boring, would directly disturb up to 10.8% of the analysis area or 134 acres of Quaternary-age alluvial and lacustrine (or playa) deposits (Table 3.10-2). Alternative B ground disturbance combined with ground disturbance from existing and future trends and actions would total up to 157 acres or 12.6% of the total analysis area. These ground-disturbing construction actions could cause damage to or loss of scientifically important fossil resources through physical impact (e.g., crushing, breaking, or displacement). Vegetation removal may displace fossils that have roots growing in or around them near the ground surface. Geotechnical, or other borings, could affect small, localized areas. After initial ground-disturbing activities, increased natural erosion of sediments in areas of cleared vegetation or graded slopes, or increased surface water usage, may expose fossils. These effects would be controlled through erosion-control measures during construction and final road design (see EIS Appendix 4). Additional disturbance may occur during reclamation activities (e.g., excavation and grading) if ground disturbance occurs in previously undisturbed sediments. Effects to paleontological resources are not expected during operation and maintenance under Alternative B because no ground-disturbing activities outside of previously disturbed areas would be expected.

Table 3.10-2. Acreage of Quaternary-Age Lacustrine or Alluvial Deposits Affected by Construction and Decommissioning

Quaternary-age lacustrine or alluvial deposits affected	Alternative B (% of analysis area)	Alternative C (% of analysis area)	Alternative D (% of analysis area)	Alternative E (% of analysis area)	Preferred Alternative (% of analysis area)
Acres affected by the project	134 acres (10.8%)	122 acres (9.8%)	70 acres (5.7%)	107 acres (8.7%)	83 acres (6.7%)
Acres affected by the project combined with existing and future trends and actions	157 acres (12.6%)	145 acres (11.7%)	93 acres (7.5%)	130 acres (10.5%)	106 acres (8.6%)

Much of the mapped Quaternary-age alluvial and lacustrine (or playa) deposits throughout the analysis area are vegetated with limited natural exposures; therefore, shallow disturbance in these areas, especially areas of low relief, would unlikely affect non-weathered deposits. Effects to paleontological resources from construction and decommissioning actions would be limited (or controlled) because of the minimal acres of Quaternary-age lacustrine or alluvial deposits within areas of potential disturbance. In addition, MVE's applicant-committed measures 97 through 99 (see Table App4-2j in EIS Appendix 4) would be implemented to reduce potential impacts to paleontological resources during construction by establishing a Paleontological Resources Treatment Plan. The Paleontological Resources Treatment Plan (Appendix Q of MVE [2023]) would be further developed to outline processes for resource avoidance, assessment, monitoring, and notification of inadvertent discoveries.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for potential disturbance of unknown fossils are summarized in Table 3.10-3 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.10-3. Mitigation for Potential Disturbance of Unknown Fossils

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
97–99	–	ss
–	–	yy

Note: All measures are detailed in EIS Appendix 4.

Implementation of these additional measures would further reduce or avoid impacts to paleontological resources by limiting the potential for inadvertent impacts to paleontological resource cave deposits and ensuring that unknown paleontological resources are analyzed and mitigated if necessary during decommissioning and reclamation activities associated with new ground disturbance. In addition, measure a would extend all applicant-committed measures to apply to operation and maintenance phases as well as construction and decommissioning.

3.10.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Construction of Alternative C would disturb slightly less of the Quaternary-age alluvial and lacustrine (or playa) deposits in the analysis area than Alternative B (122 acres [or 9.8%]; see Table 3.10-2) due to vegetation removal, excavation and grading, and geotechnical excavation and boring. Alternative C ground disturbance combined with the ground disturbance from existing and future trends would be up to 145 acres (or 11.7%) of the Quaternary deposits in the analysis area, which is slightly less than Alternative B.

The type of effects from Alternative C would be similar to other action alternatives; however, the potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits would be greater than Alternative D by 52 acres, greater than Alternative E by 15 acres, and greater than the Preferred Alternative by 39 acres. Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to paleontological resources.

3.10.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Construction of Alternative D would disturb up to 70 acres (or 5.75%) of Quaternary-age alluvial and lacustrine (or playa) deposits in the analysis area due to vegetation removal, excavation and grading, and geotechnical excavation and boring. Alternative D ground disturbance combined with the ground disturbance from existing and future trends would be up to 93 acres or 7.5% of the Quaternary deposits in the analysis area.

The type of effects from Alternative D would be similar to other action alternatives; however, the magnitude of impacts would be reduced because in comparison to all the action alternatives, except the Preferred Alternative, there would be less acres of disturbance to Quaternary-age alluvial and lacustrine (or playa) deposits. Of the action alternatives, Alternative D has the second-least potential for impacts to the Quaternary-age alluvial and lacustrine (or playa) deposits and potential paleontological resources they may contain. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to paleontological resources.

3.10.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Construction of Alternative E would disturb up to 107 acres (or 8.7%) of Quaternary-age alluvial and lacustrine (or playa) deposits in the analysis area due to vegetation removal, excavation and grading, and geotechnical excavation and boring. Alternative E ground disturbance combined with the ground disturbance from existing and future trends would be up to 130 acres (or 10.5%) of the Quaternary deposits in the analysis area.

The magnitude and type of effects for Alternative E would be similar to but slightly less than Alternatives B and C; however, the potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits would be 37 acres more than Alternative D and 24 acres more than the Preferred Alternative. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to paleontological resources.

3.10.1.2.6 PREFERRED ALTERNATIVE

Construction of the Preferred Alternative would disturb up to 107 acres (or 6.7%) of Quaternary-age alluvial and lacustrine (or playa) deposits in the analysis area due to vegetation removal, excavation and grading, and geotechnical excavation and boring. Alternative E ground disturbance combined with the ground disturbance from existing and future trends would be up to 106 acres (or 8.6%) of the Quaternary deposits in the analysis area.

The magnitude and type of effects for Alternative E would be similar to but slightly less than Alternatives B, C, and E; however, the potential for impacts to Quaternary-age alluvial and lacustrine (or playa) deposits would be 13 acres more than Alternative D. The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to paleontological resources.

3.10.1.2.7 CUMULATIVE IMPACTS

The project in combination with existing and future trends and actions would affect more acres of Quaternary-age lacustrine or alluvial deposits (see Table 3.10-2). Cumulative effects to paleontological resources would be limited (or controlled) because of the minimal acres of Quaternary-age lacustrine or alluvial deposits within areas of potential disturbance.

3.10.1.3 Significance Determination

Under all action alternatives, potential adverse effects to paleontological resources would not be significant. There are no known paleontological resources in the analysis area. With development and implementation of the Paleontological Resources Treatment Plan (Appendix Q of MVE [2023]), potential adverse effects to unknown paleontological resources would be avoided and minimized through resource avoidance, assessment, monitoring, and MVE notifying BLM of inadvertent discoveries.

3.10.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Although there are no known paleontological resources in the analysis area, construction of project infrastructure under all action alternatives could result in an irreversible loss of possible paleontological resources through disturbance to geologic units with high or moderate potential to yield fossils (Quaternary-age alluvial and lacustrine [or playa] deposits). With development and implementation of the Paleontological Resources Treatment Plan (Appendix Q of MVE [2023]), the potential for this irreversible loss would be reduced and could be entirely avoided.

3.11 POLLINATORS AND INSECTS

3.11.1 Pollinators

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.11-1.

Table 3.11-1. Analysis Approach for Pollinators

Issue Analyzed in Detail	How would the project affect pollinators?
Associated Issues Analyzed in Brief	AIB-41: Would project ground disturbance cause the introduction and spread of weeds and other invasive plant species? How would the introduction of weeds and invasive plant species affect revegetation success? AIB-42: How would project ground disturbance affect vegetation cover? AIB-44: How would vegetation phenology, and subsequently pollinators and plant reproductive success, be affected by changes to ground-level temperatures and humidity levels from turbine operation? AIB-59: Would dust from project roads affect vegetation, wildlife, and invertebrates?
Analysis Area	The siting corridors because this is the area where project disturbance of vegetation and habitat alteration would occur (Figure 3.11-1). The analysis area provides context for habitat conversion, disturbance, and risk for direct mortality.
Indicators	Acres of ground disturbance. Miles of new and improved access roads. Number of turbines proposed for each alternative.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years for grasslands and 50 years for sagebrush communities from final reclamation (as described in Section 3.15.1 [Native Upland Vegetation Communities]), for a total of 39 to 41 years for pollinators using native perennial grasslands and up to approximately 84 to 86 years for pollinators using sagebrush communities.
Data Sources	Project baseline reports for vegetation communities (WEST 2020a, 2021). LANDFIRE data for land cover (USGS and DOA 2013). Available peer-reviewed literature.

3.11.1.1 Affected Environment

Most pollinators in this region are insects (e.g., bees, wasps, flies, beetles, butterflies, and moths), but hummingbirds also pollinate. More than 400 species of pollinators occur in the state of Idaho (Idaho State Department of Agriculture 2016). Bees (Hymenoptera) are the most well-studied and important pollinating insect, though flies (Diptera) also provide substantial pollination services (Larson et al. 2001; Ssymank et al. 2011). Other insects such as beetles (Coleoptera) and wasps (Hymenoptera) provide pollination services, though to a lesser extent (Kevan 1999). Butterflies and moths (Lepidoptera) have been documented pollinating wild plant species, including some flowering plants specially adapted for butterfly pollination (Fallon et al. 2014). At least 24 genera of native bees, 22 genera of butterflies, 24 genera of wasps, and six genera of moths occur in Idaho, some of which have been studied and are known as important pollinators for native plants and agricultural crops (Idaho State University 2021). Native plants provide pollen and nectar as food for pollinators, are host plants for butterflies and moths, and provide nesting material and shelter for pollinators.

Wild pollinators, such as the monarch butterfly (*Danaus plexippus*) (see Section 3.11.3 [Monarch Butterfly]) and a number of bumble bee species (see Section 3.11.4 [BLM Special-Status Bumble Bees]), are in decline (Idaho State Department of Agriculture 2016). Pollinator declines are attributed to the loss, degradation, and fragmentation of habitat (Kremen et al. 2002; Potts et al. 2010); introduced species

(Memmott and Wasser 2002); the use of pesticides (Pisa et al. 2014); habitat disruption from grazing, mowing, and fire (Hatfield and LeBuhn 2007; Johst et al. 2006; Potts et al. 2005); and diseases and parasites (Altizer and Oberhauser 1999; Cameron et al. 2011; Colla et al. 2006; Davis and de Roode 2018). Data on local native pollinator populations are lacking.

Native and nonnative vegetation in the analysis area provide suitable habitat for a number of pollinator species; however, native vegetation is more likely to support a greater density and diversity of native pollinator species (Seitz et al. 2020) (see Figure 3.11-1). Much of the analysis area contains large populations of nonnative species (such as cheatgrass and crested wheatgrass) (see Section 3.15.1 [Native Upland Vegetation Communities]), which compete with native plants that provide more suitable habitat for native pollinators. Big sagebrush shrublands and closed-basin playas are scattered throughout the analysis area (USGS and DOA 2013; WEST 2020a, 2021) (see Figure 3.15-1) and may provide higher quality native habitat for pollinators than grasslands dominated by nonnative species. A recent study of native and nonnative pollinator-friendly species and native bee diversity showed that although overall bee use of both native and nonnative plant plots was similar, there were measurable differences in bee community composition between native and nonnative plant plots, and changes in availability of native plants may alter foraging patterns, bee community assemblage, and bee-plant network structures (Seitz et al. 2020). Landcover dominated by nonnative species is present across 28,793 acres (34%) of the analysis area. Approximately 3,557 acres (4%) of the analysis area are agricultural lands. Existing sagebrush communities may offer refugia to native pollinators and make up more than 31,613 acres (38%) of the analysis area. The remaining 24% comprises other native communities that may also provide important habitats for native pollinators (woodlands, shrubland, shrub-steppe, and grassland [20%]), developed areas (3%), and riparian and wetland communities and open water (1%) (USGS and DOA 2013).

When used indiscriminately, pesticides may be directly toxic to some pollinators and can reduce the quality of habitat by removing nectar and pollen resources and host plants (Kearns et al. 1998; Stark et al. 2012). Pesticide application to control nonnative and invasive plant species could affect pollinators. A study in Colorado of pesticide levels in native bees sampled from grassland and agricultural areas found pesticides in 70% of all native bees and more than two pesticides found in 48% of bees (Hadlik et al. 2016). Exposure to pesticides can compound the effects of other stressors on pollinator populations, such as loss of habitat and exposure to pathogens and diseases. Pesticides, including fungicides and herbicides, can exert sublethal and lethal effects on individual pollinators. Effects vary with exposure level, duration, and route of exposure, as well as the characteristics of the pesticide and interactions among pesticides (Sponsler et al. 2019). These effects could manifest at a population level. Existing habitats in the analysis area that would be subject to pesticide application (agricultural lands, roads, development, areas containing nonnative plant species that would be treated, and habitat restoration areas) present a risk for mortality or sublethal effects for pollinator species. Pesticide drift from agricultural lands could reduce the suitability of adjacent areas of native vegetation for pollinators (Krupke et al. 2012).

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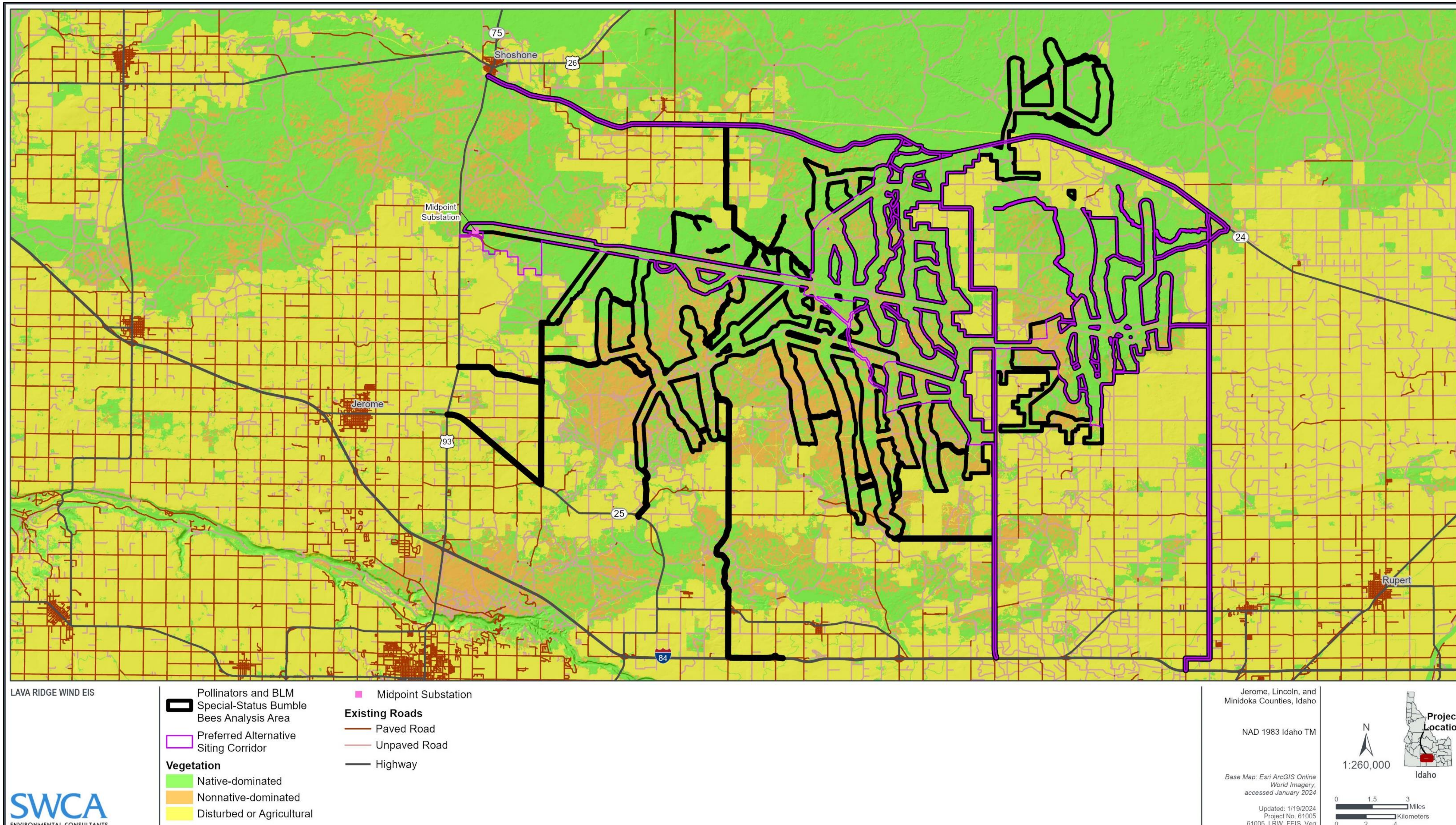

Figure 3.11-1. Pollinators and BLM special-status bumble bees analysis area.

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Roads can be a source of mortality for pollinators due to collisions with vehicles (Keilsohn et al. 2018). Roads fragment and degrade habitat (Trombulak and Frissell 2000) and may act as barriers to pollinator movement (Valtonen and Saarinen 2005). Many nonnative and invasive plants are disproportionately present in roadsides where they have optimal conditions for invasion and dispersal (Hansen and Clevenger 2005; Gelberd and Belnap 2003). Large-scale studies that directly connect presence of nonnative plants species with declines in pollinator abundance and diversity are lacking (Stout and Tiedeken 2017); however, recent evidence indicates that nonnative plant invasion may have effects on biodiversity and abundance for some native pollinators (Seitz et al. 2020). In addition, roadsides are exposed to pesticide drift from adjacent land (Krupke et al. 2012) and to pollution from vehicles (Hopwood et al. 2015). Roadside vegetation management can be harmful to pollinators (Johst et al. 2006) because mowing, pesticide use, prescribed burning, and grazing all remove flowering plants that pollinators rely on for food. There are approximately 401 miles of existing roads (paved and unpaved) in the analysis area that present a current and ongoing risk of direct mortality via vehicle strikes, pesticide application, and roadside vegetation maintenance, and that contribute to habitat fragmentation.

3.11.1.1.1 EXISTING AND FUTURE TRENDS AND PLANNED ACTIONS

Existing and future trends and actions have and will continue to influence pollinator habitat in the analysis area through habitat alteration and fragmentation, introduction of invasive plant species, or conversion of native habitat to agriculture or rural residential. Approximately 30,486 acres (36%) of the analysis area are dominated by nonnative plant species, have been converted to agriculture or rural residential, are disturbed (contain roads and other development), are proposed for other renewable energy development, or are existing ROWs (which may be subject to ongoing and future surface and vegetation-disturbing activities and pesticide application for vegetation management) (USGS and DOA 2013) (Figure 3.11-2). Past vegetation treatments, seeding projects, and wildfire have affected another 47,142 acres (56%) of the analysis area. These areas may not currently provide functional habitat for pollinators but could be restored or naturally recover over time. Overall, these existing and future trends and actions have affected or will affect 77,628 acres (92%) of the analysis area and 46,296 acres (92%) of the mapped native upland vegetation communities in the analysis area.

3.11.1.2 Impacts

3.11.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and pollinators would only be affected by existing and future trends and actions.

3.11.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect pollinators through habitat alteration and loss (from work areas and infrastructure, and project lighting) and through displacement, injury, or mortality (vehicle strikes, collision with turbine blades, application of herbicides or pesticides, and removal of vegetation).

Habitat Alteration and Loss

Alternative B would alter or remove pollinator habitats for the life of the project (the time period encompassing construction through decommissioning). The estimated ground disturbance area is presented in Table 3.11-2. New and improved access roads would be constructed during the 2-year construction phase, and use and maintenance would continue for the life of the project (see Table 3.11-2). Successful reclamation is estimated to require up to 5 years for grasslands and up to 50 years for sagebrush communities after decommissioning (as described in Section 3.15.1 [Native Upland Vegetation Communities]), and therefore effects to habitat quality within reclaimed areas are likely to continue for that time period. It is possible that the BLM would choose to leave project roads in place; if that occurs, the effects of the roads on pollinators would last for the life of the road.

Project turbines may cause air mixing and turbulence that could alter bloom timing of plant species and change the availability of nectar resources on up to 2,511 acres (3%) of the analysis area (see AIB-44 in EIS Appendix 3). Ground disturbance and vegetation removal would reduce numbers of existing native plants that provide forage and breeding habitat for pollinator species. Although pesticides used for vegetation management would reduce the risk for introduction or spread of nonnative species and promote growth of native plants, pesticides could also reduce the quality of habitat by removing floral resources and host plants. Some pollinators may depend on nonnative plant species for nectar resources when native plant species are unavailable (McKnight et al. 2018), or the change in available plant species may result in a shift in pollinator community composition (Seitz et al. 2020). Nonnative plants can also be of poorer nutritional quality for pollinators and, if they become dominate over native vegetation, can narrow the window that blooming plants are available for pollinators each year (Vanbergen et al. 2018). Disturbance of native vegetation communities (see Table 3.11-2) during project operations in the analysis area would reduce the availability of valuable refugia for pollinators and could influence changes in pollinator community structure.

Table 3.11-2. Summary of Impacts to Pollinators

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of ground disturbance	**Work areas:** 4,193 acres native communities 1,990 acres nonnative-dominated communities 558 acres agriculture and disturbed land **Infrastructure:** 1,474 acres native communities 700 acres nonnative-dominated communities 196 acres agriculture and disturbed land	**Work areas:** 3,219 acres native communities 1,454 acres nonnative-dominated communities 466 acres agriculture and disturbed land **Infrastructure**: 1,136 acres native communities 513 acres nonnative-dominated communities 164 acres agriculture and disturbed land	**Work areas:** 2,300 acres native communities 1,135 acres nonnative-dominated communities 277 acres agriculture and disturbed land **Infrastructure**: 695 acres native communities 343 acres nonnative-dominated communities 84 acres agriculture and disturbed land	**Work areas:** 2,560 acres native communities 802 acres nonnative-dominated communities 373 acres agriculture and disturbed land **Infrastructure:** 962 acres native communities 301 acres nonnative-dominated communities 140 acres agriculture and disturbed land	**Work areas:** 2,403 acres native communities 768 acres nonnative-dominated communities 330 acres agriculture and disturbed land **Infrastructure:** 682 acres native communities 218 acres nonnative-dominated communities 94 acres agriculture and disturbed land
Miles of new and improved access roads	**New road:** 307 miles native communities 156 miles nonnative-dominated communities 8 miles agriculture and developed land **Improved road:** 96 miles native communities 39 miles nonnative-dominated communities 126 miles agriculture and developed land	**New road:** 228 miles native communities 112 miles nonnative-dominated communities 7 miles agriculture and developed land **Improved road:** 79 miles native communities 26 miles nonnative-dominated communities 112 miles agriculture and developed land	**New road:** 170 miles native communities 95 miles nonnative-dominated communities 5 miles agriculture and developed land **Improved road:** 57 miles native communities 23 miles nonnative-dominated communities 73 miles agriculture and developed land	**New road:** 194 miles native communities 63 miles nonnative-dominated communities 7 miles agriculture and developed land **Improved road:** 67 miles native communities 18 miles nonnative-dominated communities 98 miles agriculture and developed land	**New road:** 165 miles native communities 57 miles nonnative-dominated communities 6 miles agriculture and developed land **Improved road:** 57 miles native communities 15 miles nonnative-dominated communities 84 miles agriculture and developed land
Number of turbines	349–400	259–378	179–280	194–269	241

Source: USGS and DOA (2013).

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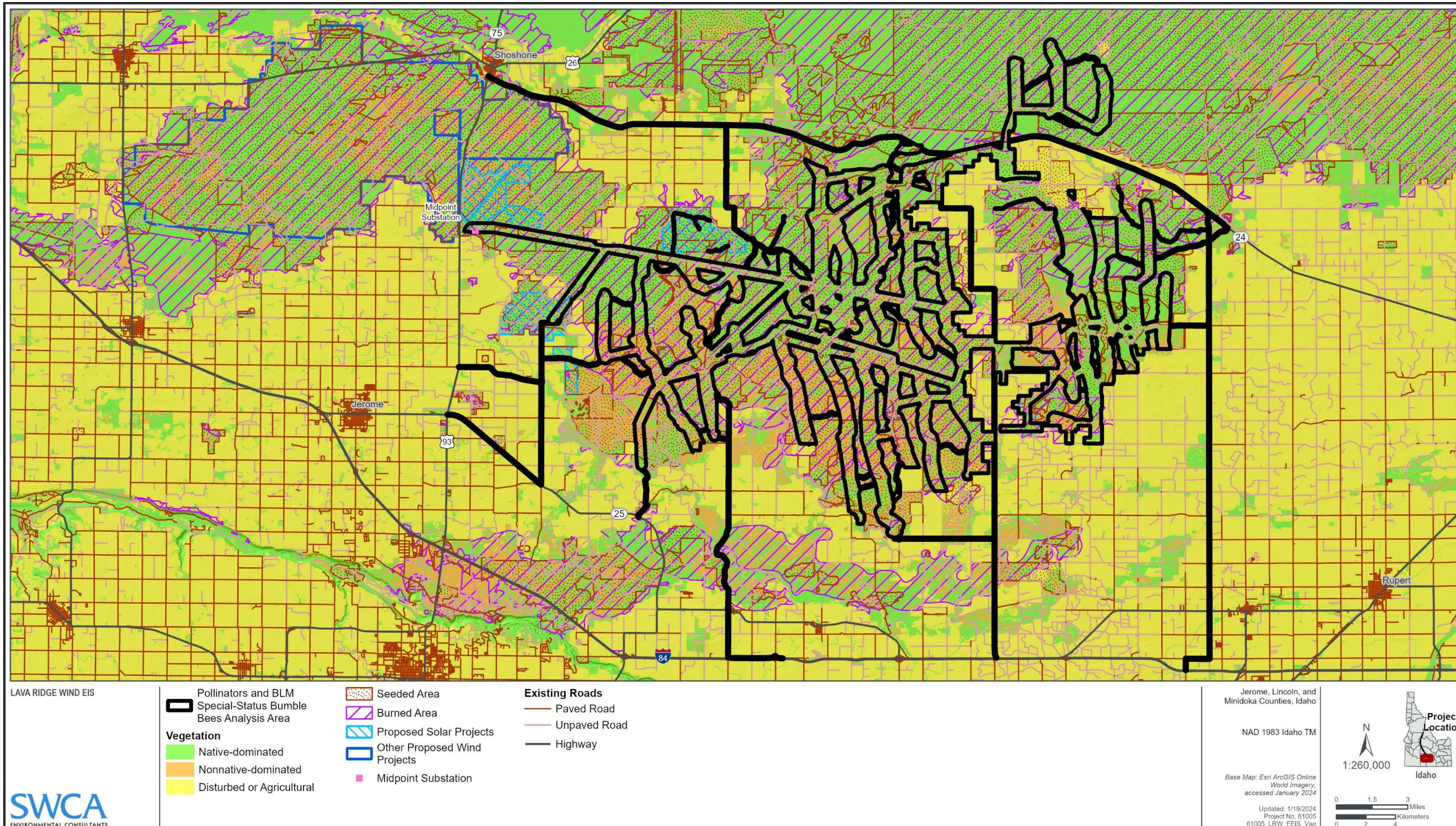

Figure 3.11-2. Existing and future trends and actions in the pollinators and BLM special-status bumble bees analysis area.

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MVE's applicant-committed measure to minimize work areas and infrastructure areas (measure 1) would minimize potential degradation of pollinator habitat. Applicant-committed measures to prevent the introduction or spread of weeds and nonnative species (measures 100 to 112), including implementation of a Noxious Weed Management Plan (Appendix R of MVE [2023]), would also minimize the potential for the project to degrade pollinator habitat. These measures include the use of weed-free seed mixes and mulch, cleaning of vehicles and machinery, and the use of a BLM-approved herbicide plan. MVE would restore ground disturbance areas using native seed mixes that incorporate pollinator plant species (applicant-committed measure 102). Interim reclamation would be irrigated if necessary for establishing seedlings more quickly. Mulching techniques would be used to expedite reclamation and to protect soils (required mitigation measure Q). Reclamation areas would be monitored until the success criteria is met or up to 5 years following the initial reclamation activities (applicant-committed measure 163). These plans and measures would help reduce but not eliminate the potential localized impacts on pollinator species.

Displacement, Injury, or Mortality

Ground disturbance and vegetation removal would crush, injure, or displace individual pollinators, if present. Although pesticides used for vegetation management would reduce the risk for introduction or spread of nonnative species, pesticides may also be toxic to some pollinators; however, BLM (2007, 2016) conclude that herbicides pose little to no risk to pollinating insects at typical application rates.

Alternative B would install up to 400 turbines. Large numbers of insects may be killed by wind turbines (Corten and Veldkamp 2001; Han et al. 2018). A recent study in Germany estimated that a single turbine in a temperate zone may kill up to 40 million flying insects per year (Voigt 2021). Some insect species may be attracted to the turbines themselves, such as swarming or hill-topping species. Since swarming and migration are linked to mating and dispersal, respectively, fatalities at wind turbines may affect insect populations at various spatial scales (Voight 2021). Construction of turbines would result in mortality of pollinator species that travel within the rotor-swept area. Nocturnal pollinators such as moths may also be attracted to project lighting, which would increase the risk of mortality. Applicant-committed measures to minimize project lighting (measures 20–24), such as deactivating unnecessary project lighting at night to limit wildlife attraction, would reduce the area of attraction for nocturnal pollinators.

Decline of insect populations could also diminish their ecosystem function, such as pollination. Declines in pollinators can thus reduce the ability for plants to reproduce and maintain native vegetation community components. Although largely unknown in the region, insect migration routes often follow wind currents and may overlap with the location of wind facilities. Similarly, insect migration routes and bat movement may be coincident (Rydell et al. 2010). Therefore, siting of turbines to minimize impacts to bats would also reduce the risk of mortality for migratory and nonmigratory flying insects (applicant-committed measures 136 and 138).

Operation of the turbines and increased vehicle traffic could also contribute to pollinator mortality via strikes with the turbine blades, other equipment, and vehicles. An average of 1,103 trips per day (passenger and heavy vehicles) would be required during construction, 38 per day would be required during operation, and 1,270 trips per day would be required during decommissioning (see EIS Table 2.4-3). Mortality from vehicle strikes would be commensurate with the level of project use along each road, season of use (mortality would be higher in spring through fall versus winter when fewer pollinators are active), and to some extent, surrounding habitat type.

The number, size, and length of roads would be minimized to the extent feasible (applicant-committed measure 4). Carpooling among construction workers would be encouraged to the extent practical in order to reduce the number of vehicles entering and exiting the site on a daily basis (applicant-committed measure 40). Fewer vehicles would decrease the potential for pollinator collisions with vehicles; the extent to which this would occur would be commiserate with the actual reduction in vehicle traffic.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for pollinators are summarized in Table 3.11-3 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.11-3. Mitigation for Pollinators

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	Q	a
4	–	l
20–24	–	kk–ll
40	–	oo–pp
100–112	–	aaa–ccc
136	–	nnn–ooo
138	–	–
163	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to pollinators by requiring avoidance and minimization measures be applied throughout the life of the project and reducing the need for herbicide applications by minimizing the potential for introduction and spread of invasive plant species, which may degrade pollinator habitat. Avoidance of insecticides and pesticides would avoid sources of project-related mortality for pollinators. However, the potential for vehicle strikes would be increased because traffic volume would be higher (see EIS Table 2.4-3) due to the increased duration of the construction phase (3 years instead of 2).

3.11.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B with Additional Measures, though the magnitude of effects would likely be reduced (see Table 3.11-2). Since Alternative C would eliminate siting corridors in areas containing a high proportion of native vegetation communities (such as areas north of ID 24), it would further reduce potential alteration and fragmentation of pollinator habitat in native vegetation communities when compared to Alternative B.

3.11.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative B with Additional Measures, though the magnitude of impacts would likely be greatly reduced (see Table 3.11-2). Direct mortality for pollinator individuals from vehicle strikes and/or turbines would be reduced commensurate with the decrease in total miles of new and improved road and number of turbines when compared to

Alternatives B and C. Traffic volume would also be the lowest of the action alternatives (see EIS Table 2.4-3). Similarly, potential effects to pollinator habitat would also be reduced commensurate with the reduction in ground disturbance, when compared to Alternatives B and C. Alternative D would not only eliminate the same siting corridors as Alternative C, but would also eliminate most of the siting corridors east of Crestview Road to reduce development in areas that have higher cover of native vegetation. This would result in the second-smallest acreage of siting corridors of the action alternatives. Since siting corridors would be eliminated in areas containing a high proportion of native vegetation communities (such as those east of Crestview Road), Alternative D would result in the least potential alteration and fragmentation of pollinator habitat in native vegetation communities.

3.11.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to those from Alternative C, though the magnitude of impacts would likely be reduced (see Table 3.11-2). Alternative E would additionally reduce or eliminate siting corridors west of Crestview Road and south of the existing WEC. Potential effects to pollinator habitat would be less than Alternatives B and C but greater than Alternative D and the Preferred Alternative. However, because the southern siting corridors that would be eliminated are in areas dominated by nonnative communities, reduction of potential alteration and fragmentation of pollinator habitat in native vegetation communities would be less than Alternative D and the Preferred Alternative and more than Alternatives B and C.

Alternative E would have a much lower traffic volume than Alternatives B and C, which would reduce the risk of direct mortality on pollinator individuals. However, traffic volume would be slightly greater than Alternative D and the Preferred Alternative.

3.11.1.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to those from Alternative E. Potential effects to pollinator habitat would also be reduced commensurate with the reduction in ground disturbance, and would be the least of the action alternatives. However, because the southern siting corridors that would be eliminated are in areas dominated by nonnative communities, potential alteration and fragmentation of pollinator habitat in native vegetation communities would be less than Alternatives B, C, and E but greater than Alternative D.

The Preferred Alternative would have the second-lowest traffic volume of the action alternatives, which would reduce the risk of direct mortality of pollinator individuals.

3.11.1.2.7 CUMULATIVE IMPACTS

As described above, approximately 92% of the analysis area has been impacted by human development, the invasion of nonnative plants, past vegetation treatments, and wildfire and may no longer provide quality native habitat for pollinators. Nonnative-dominated communities and/or developed lands may provide alternate habitats for pollinator species, though these habitats may host different species composition than those occupying native habitat. Alternative B would disturb 11% of all types of habitat in the analysis area (inclusive of native vegetation communities, nonnative-dominated communities, and disturbed and developed lands), which would further fragment and degrade the remaining native vegetation and pollinator habitat in the analysis area. The other action alternatives would disturb less of these habitats in the analysis area and thus have fewer contributions to cumulative effects.

3.11.1.3 Significance Determination

Under all action alternatives, potential adverse effects to pollinators would not be significant. All action alternatives would have adverse effects on pollinators through habitat alteration and loss and through displacement, injury, or mortality. Because most areas would be reclaimed and restored in the interim and long term and because large areas of similar habitat would remain available in the broader landscape, these impacts would not be significant. Depending on the pollinator species and their vegetation needs, the duration of adverse effects to some species could be as few as 5 years following interim reclamation.

3.11.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would have irretrievable effects on pollinators through habitat alteration and loss (from work areas and infrastructure) and through displacement, injury, or mortality (vehicle strikes; collision with turbine blades; and application of herbicides or pesticides, removal of vegetation). Habitat alteration and loss effects would last up to 39 to 41 years for pollinators using perennial grasslands and up to 84 to 86 years for pollinators using sagebrush communities, which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years for perennial grasslands or 50 years for sagebrush communities to reestablish after final reclamation. Displacement, injury, or mortality effects would occur during the life of the project. These impacts would not be irreversible because most areas would be reclaimed and restored in the interim and long term and because large areas of similar habitat would remain available in the broader landscape. Additional irreversible effects would occur post-project in areas where very fragile soils are disturbed and reclamation potential is limited, where concrete foundations remain following decommissioning, and where the BLM may choose to leave roads in place (as described in Section 3.15.1.3 [Native Upland Vegetation Communities]) resulting in permanent habitat loss.

3.11.2 St. Anthony Sand Dune Tiger Beetle

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.11-4.

Table 3.11-4. Analysis Approach for St. Anthony Sand Dune Tiger Beetle

Issue Analyzed in Detail	How would the project affect St. Anthony sand dune tiger beetle (*Cicindela arenicola*) habitat and population?
Associated Issues Analyzed in Brief	AIB-59: Would dust from project roads affect vegetation, wildlife, and invertebrates?
Analysis Area	Suitable (good and marginal) habitat for the species plus the area within 0.75 mile of this suitable habitat (i.e., the species' dispersal range [Logan 1995]) (Figure 3.11-3). This analysis area comprises 13,409 acres and provides context for the potential changes in habitat conditions at a home range scale.
Indicators	Acres of ground disturbance in St. Anthony sand dune tiger beetle habitat. Project activities in St. Anthony sand dune tiger beetle dispersal habitat (i.e., within 0.75 mile of existing habitat).
Impacts Duration	The life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives.
Data Sources	Project baseline reports to identify locations of suitable habitat (WEST 2020b). Existing literature.

3.11.2.1 Affected Environment

St. Anthony sand dune tiger beetle is a BLM special-status species that is known to occur in the analysis area (WEST 2020b). The greatest concentration of this species is in the St. Anthony dunes, which are more than 100 miles northeast of the analysis area, though this species has been recorded from several other smaller and more isolated dunes. Recently, its range was extended into sand dunes in the Centennial Valley of Montana (Winton et al. 2010). Extensive surveys and biological studies conducted in 1988 and 1989 by Anderson located this species at many sites across eight counties in Idaho and estimated the total population at as many as one million adults (Idaho State Conservation Effort 1996). Surveys conducted in 1994 recorded small numbers of this species in four additional counties (Logan 1995). The analysis area contains the westernmost known population of this species associated with the Dietrich dune complex, and this population is isolated from other known populations. Historic records near Lake Walcott (on the Minidoka National Wildlife Refuge), on dune complexes near Bonanza Lake more than 30 miles southeast of the analysis area (Logan 1995), and on the Heyburn Dune complex (near Burley, Idaho) (Makela 1994) are the closest populations to the Dietrich dunes population. Although tiger beetles can be found on many dunes in the general region, the small size and isolated nature of many of the dunes make them vulnerable to disturbance and incremental loss over time. The more isolated, smaller dunes may support beetle populations of relatively low numbers (such as the Dietrich population). Protection of these small, isolated dunes along with the larger dune complexes may be integral to the long-term preservation of the species (Idaho State Conservation Effort 1996).

Larva and adult St. Anthony sand dune tiger beetle feed on other invertebrates. This species overwinters as pupae or as adults beneath the surface of the sand. Larvae use burrows located in more stable areas of dunes, such as the flat, grassy areas on the windward side of dunes and where the sand is at least 3 feet thick, and larvae may remain in the burrows for 2 to 4 years. Initially, larvae burrows are very shallow and vulnerable to disturbance. Adults generally emerge from February through May and have been documented to disperse from their points of emergence to up to 0.75 mile, at a rate of 0.5 mile per 2 months, in a step-wise manner between areas of suitable habitat (Logan 1995), though longer-distance movement may occur. Because of their long maturation period, limited dispersal abilities, distance from other known populations and suitable habitat, and vulnerability to mortality during the larval stage, populations of this species are vulnerable. Ground disturbance can kill larvae and adults while vegetative encroachment may stabilize dune habitats and reduce the availability of bare ground needed by adults and larvae (Knisley et al 2014).

MVE completed a desktop assessment and field survey of potential habitat for St. Anthony sand dune tiger beetle in the analysis area in 2020 (WEST 2020b). Areas of potential habitat were identified using historical observation records in combination with soil survey data and aerial imagery. Based on the desktop analysis, 285 acres of potential beetle habitat in the analysis area were evaluated in the field for suitability. Habitat suitability was verified in the field based primarily on vegetation cover. Habitat was classified as good (vegetation cover < 20%), marginal (vegetation cover 20%–60%), or poor (vegetation cover > 60%) (WEST 2020b). Of the acres surveyed, 280 acres had potential and/or occupied habitat for the St. Anthony sand dune tiger beetle (i.e., sand dunes or areas of low to moderate vegetation cover and/or observations of the beetle during field verification). The field verification classified 18 acres as good, 130 acres as marginal, and 132 acres as poor habitat. Five acres of potential habitat identified in the desktop evaluation contained no habitat because of dense vegetation and lack of sand substrate and are not included in the 280 acres of mapped habitat.

Concurrent with field verification, surveys for beetle individuals were also conducted between May 17 and June 5, 2020. Eighteen adult beetles were recorded in the analysis area; 14 of the 18 adults were recorded in one area that was described as the largest and least vegetated dune in the analysis area. The remaining four beetles were detected in two areas on smaller dunes. No beetles were recorded within the siting corridors; the nearest occupied habitat was approximately 0.5 mile from the nearest siting corridor. Areas where beetles were recorded were all classified as good habitat (WEST 2020b). Additionally, all beetle observations overlapped historical observations from a 2009 survey (IDFG 2020). A previous survey in 1995 did not record beetles in the same area (Idaho State Conservation Effort 1996). During field verification, some areas were classified as poor habitat due to disturbance (clearing of vegetation along the highway); these areas were immediately adjacent to areas of good habitat in which historical observations of beetles were recorded. The presence of cheatgrass was noted in and adjacent to these cleared areas, and because of disturbance and presence of nonnative plant species, they may not currently provide suitable habitat for this species (WEST 2020b). Recent studies have evaluated the potential for restoration of dune habitats for tiger beetles with the selective application of herbicides to combat invasion of nonnative vegetation (Bouffard et al. 2009).

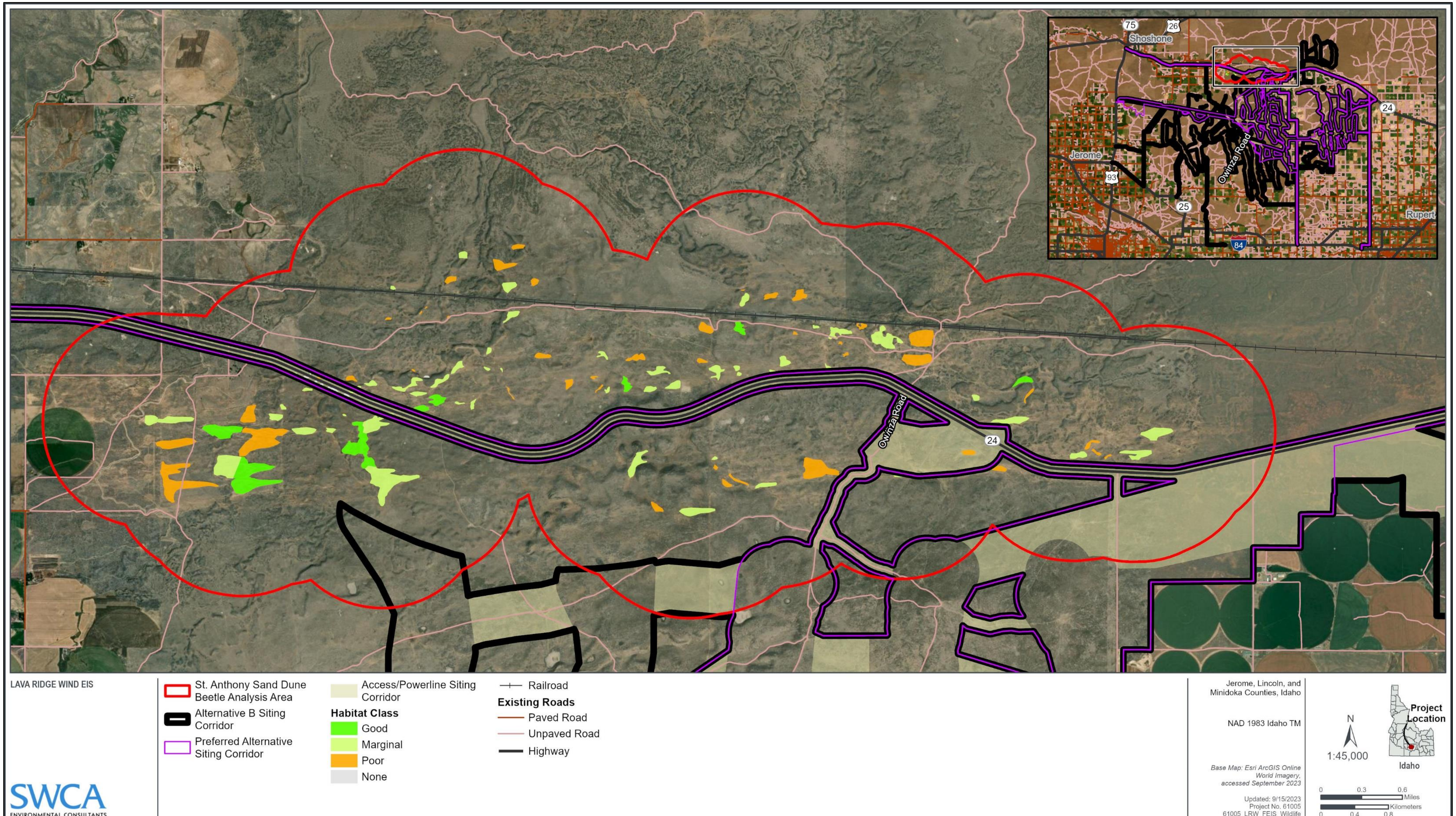

Figure 3.11-3. St. Anthony sand dune tiger beetle analysis area.

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3.11.2.1.1 EXISTING AND FUTURE TRENDS AND PLANNED ACTIONS

Existing and future trends and actions have and will continue to influence St. Anthony sand dune tiger beetle habitat and dispersal area in the analysis area through habitat disturbance, fragmentation, introduction of invasive plant species, habitat conversion or alteration due to road development, and construction of dispersal barriers (see Figure 3.11-2). The Dietrich dune complex was historically a large dune complex that was once heavily grazed and has been planted with crested wheatgrass as a part of a stabilization project before 1995 (Logan 1995). Approximately 11,835 acres (88%) of the analysis area are dominated by nonnative plant species; are disturbed (contain roads, development, agriculture, or reclamation); are existing ROWs or energy development; or have been subject to wildfire, past vegetation treatments, and seeding projects. Of this area, 1,760 acres (13%) are disturbance associated with development and ROWs, which would be considered longer-term disturbance when compared to vegetation treatments, wildfire, and seeding. Much of this disturbance is concentrated through the central portion of the analysis area and is largely associated with the presence of ID 24, which is adjacent to the habitat areas where beetle individuals were observed. Approximately 9 miles of existing paved road (ID 24) and 26 miles of existing unpaved roads occur in the analysis area. The UPRR runs east-west for 7 miles through the northern portion of the analysis area, and an existing transmission line runs northeast-southwest for 3 miles through the eastern portion of the analysis area. These existing facilities present a current and ongoing risk of direct mortality via vehicle strikes, pesticide application, and roadside vegetation maintenance, and contribute to habitat fragmentation. ID 24, in particular, is located directly between the areas of habitat where individual beetles were observed and likely presents a barrier to dispersing individuals between suitable habitat areas. The analysis area also contains portions of three grazing allotments (Star Lake, Dietrich Butte, and Wildhorse).

3.11.2.2 Impacts

3.11.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and St. Anthony sand dune tiger beetle would only be affected by existing and future trends and actions.

3.11.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect St. Anthony sand dune tiger beetle habitat and populations through habitat alteration and loss (from work areas and placement of infrastructure and dune stabilization from expansion of nonnative vegetation) and injury or mortality (vehicle strikes and crushing of individuals by workers or construction equipment).

Due to the vulnerability of St. Anthony sand dune tiger beetle during critical life stages (such as early larval stage) to ground disturbance and the burrowing habits of this species, construction activity and/or overland travel (either on foot or by vehicle) in good or marginal habitat may result in direct mortality of individuals. Additionally, because of the limited availability and range of suitable habitat for this species and limited dispersal, populations may be particularly sensitive to disturbance and/or degradation of existing habitat, such as stabilization of dune systems from expansion of nonnative vegetation. Such degradation could occur if project facilities are located adjacent to habitat and fragment dispersal corridors between areas of suitable habitat and/or allow for increased risk of invasion of nonnative plant species. Although project ground disturbance would largely avoid direct alteration of high-quality habitat for St. Anthony sand dune tiger beetle, placement of new infrastructure and an increase in vehicle traffic and human presence in the dispersal area for St. Anthony sand dune tiger beetle (0.75 mile from mapped habitat) may result in mortality of dispersing individuals. Individual St. Anthony sand dune tiger beetles in the early larval stage may also be subject to direct mortality if construction and/or operation personnel leave the work areas and walk across sand dune habitat and inadvertently crush individual larvae occupying shallow burrows.

Most project components would be located outside mapped St. Anthony sand dune tiger beetle habitat. As described in Section 3.11.2.1 (Affected Environment), individuals have been recorded in mapped habitat areas identified as good habitat and not recorded in mapped habitat areas identified as marginal or poor. The nearest turbine siting corridor would be approximately 0.15 mile south of the nearest mapped marginal habitat and approximately 0.5 mile southeast of the nearest mapped good habitat where individuals have been recorded. These siting corridors may fragment potential dispersal habitat if suitable dune habitat that has not been mapped is present south of the current mapped habitat for this species. Construction and maintenance activities and vehicle use along proposed access roads may result in direct mortality of dispersing adults in the analysis area, should individuals disperse south of the current mapped habitat.

No new access roads would be constructed within mapped St. Anthony sand dune tiger beetle habitat, though one new access road, connecting ID 24 and Owinza Road, would be constructed between areas of poor and marginal mapped habitat south of ID 24 and marginal habitats located north of ID 24. No St. Anthony sand dune tiger beetle individuals have been recorded in these habitat areas; however, construction of the access road would contribute to fragmentation of dispersal areas between mapped habitats and may result in direct mortality of dispersing individuals if present in the mapped habitat areas adjacent to the new access road during construction and operation.

A collector line siting corridor would follow ID 24 and bisect the mapped habitat areas (see Figure 3.11-3). Specifically, this proposed corridor would intersect less than 1 acre of good habitat, 3 acres of marginal habitat, and 2 acres of poor habitat (a total of 2% of the mapped habitat and 4% of the suitable habitat in the St. Anthony sand dune tiger beetle analysis area) (Table 3.11-5). St. Anthony sand dune tiger beetle individuals have been observed within the good and marginal habitat areas that may be disturbed along ID 24. A new collector line would be constructed anywhere within this corridor and would increase current levels of disturbance and the likelihood of mortality associated with the existing highway. Construction in this area would disturb 0.04 acre of good habitat, 0.35 acre of marginal habitat, and 0.24 acre of poor habitat. Disturbance of these habitats may result in the mortality of adult and larval life stage St. Anthony sand dune tiger beetles if individuals are present in the disturbance areas. Increased project traffic along ID 24 and existing access roads may result in the increased mortality of individuals dispersing between mapped habitat areas.

MVE’s applicant-committed measures to minimize the project footprint (measure 1) and to avoid, minimize, and/or mitigate for impacts to environmentally sensitive areas to the greatest extent feasible (measure 3) would help minimize the likelihood of effects to beetles. Before construction, MVE would identify all potential habitat for sensitive species relative to planned disturbances. Areas of potential habitat where absence has not been confirmed and areas previously unsurveyed would be targeted for construction clearance surveys (applicant-committed measure 12). Signs, flags, and/or fencing would be used to delineate and protect sensitive environmental resources near construction activities (applicant-committed measure 14).

Occupied and good habitat for St. Anthony sand dune tiger beetle would be marked for avoidance (applicant-committed measure 16). Where avoidance is not possible, field surveys would be conducted to determine if the habitat is occupied. Project construction would avoid any newly identified occupied habitat to the extent feasible. For construction activities located within 0.6 mile of occupied habitat and good habitat, silt fencing would be installed and maintained at the limits of ground disturbance to minimize the risk of dispersing beetles entering the work area. In addition, applicant-committed measures

100 to 112 to prevent the introduction or spread of weeds and invasive plant species would minimize the potential for the project to degrade beetle habitat.

The number, size, and length of roads would be minimized to the extent feasible (applicant-committed measure 4). Carpooling among construction workers would be encouraged to the extent practical in order to reduce the number of vehicles entering and exiting the site on a daily basis (applicant-committed measure 39). Fewer vehicles would decrease the potential for pollinator collisions with vehicles; the extent to which this would occur would be commiserate with the actual reduction in vehicle traffic.

These measures would help reduce but not eliminate the potential impacts on St. Anthony sand dune tiger beetle habitat and individuals.

Table 3.11-5. Summary of Impacts to St. Anthony Sand Dune Tiger Beetle

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres ground disturbance in mapped beetle habitat	0.04 acre good 0.35 acre marginal 0.24 acre poor	0.04 acre good 0.34 acre marginal 0.24 acre poor	0.04 acre good 0.32 acre marginal 0.22 acre poor	0.04 acre good 0.32 acre marginal 0.23 acre poor	0.04 acre good 0.32 acre marginal 0.22 acre poor
Project activities in dispersal habitat (within 0.75 mile of mapped good and marginal habitat)	One new access road between areas of poor and marginal habitat south of ID 24 and marginal habitat north of ID 24.	Same as Alternative B; however, traffic volume on project access roads would be increased	Same as Alternative B; however, traffic volume on project access roads would be reduced.	Same as Alternative B; however, traffic volume on project access roads would be reduced.	Same as Alternative B; however, traffic volume on project access roads would be reduced

Note: St. Anthony sand dune tiger beetle habitat is shown in Figure 3.11-3.
Source: WEST (2020b).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for St. Anthony sand dune tiger beetle are summarized in Table 3.11-6 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.11-6. Mitigation for St. Anthony Sand Dune Tiger Beetle

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	–	a
3–4	–	l
12	–	kk–ll
14	-	oo-pp
16	-	aaa-ccc
39	-	iii-jjj
100-112	-	nnn-ooo

Note: All measures are detailed in EIS Appendix 4.

Implementation of the additional minimization measures under Alternative B in addition to those described in Section 3.11.1.2.2 (Pollinators, Alternative B [Proposed Action]) would reduce or avoid impacts to St. Anthony sand dune tiger beetles by eliminating the potential for project activities to degrade existing occupied habitat. Implementation of these measures would also reduce the potential for mortality of individuals that may be present outside of occupied habitat from inadvertent crushing in the larval stage and from use of insecticides and pesticides.

Alternative B, even with the implementation of additional minimization measures intended to reduce habitat disturbance and mortality, would still result in degradation and fragmentation of dispersal habitat. The risk of direct mortality from vehicle traffic on existing and proposed access roads would also be increased because traffic volume would be higher as a result of the extended construction phase (3 years instead of 2). Construction of the new access road between mapped habitats, in particular, would contribute to fragmentation of dispersal habitat and risk of direct mortality of dispersing individuals.

3.11.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Effects to mapped St. Anthony sand dune tiger beetle habitat and dispersal areas from Alternative C would be similar to Alternative B with Additional Measures (see Table 3.11-5). Though this alternative would remove corridors in the southern portion of the potential dispersal area for tiger beetle, all mapped habitat areas are located north of the removed corridors. Thus, Alternative C would be unlikely to reduce overall fragmentation of dispersal corridors between suitable habitats. The remaining siting corridors that would impact mapped tiger beetle habitat and dispersal areas would be nearly the same under all action alternatives (see Table 3.11-5). Vehicle traffic and the associated potential for mortality from vehicle strikes would be slightly greater than Alternative B but slightly less than Alternative B with Additional Measures (see EIS Table 2.4-3).

3.11.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Effects to mapped St. Anthony sand dune tiger beetle habitat and dispersal areas from Alternative D would be similar to Alternative C (see Table 3.11-5). Alternative D would have the lowest traffic volume of the action alternatives (see EIS Table 2.4-3), which may reduce the risk for mortality of dispersing adult tiger beetles.

3.11.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Effects to mapped St. Anthony sand dune tiger beetle habitat and dispersal areas from Alternative E would be similar to Alternative D (see Table 3.11-5). Alternative E would have a lower traffic volume than Alternatives B and C (see EIS Table 2.4-3), which may reduce the risk for mortality of dispersing adult tiger beetles to some degree. However, traffic volume would be slightly greater than Alternatives D and the Preferred Alternative.

3.11.2.2.6 PREFERRED ALTERNATIVE

Effects to mapped St. Anthony sand dune tiger beetle habitat and dispersal areas from the Preferred Alternative would be similar to Alternative D. The Preferred Alternative would have the second-lowest traffic volume of the action alternatives (see EIS Table 2.4-3).

3.11.2.2.7 CUMULATIVE IMPACTS

As described above, approximately 88% of the analysis area (representing mapped habitat and dispersal areas) has been impacted by human development, invasion of nonnative plants, wildfire, and past vegetation treatments (including seeding projects) and may not currently provide functional habitat for St. Anthony sand dune tiger beetle. Alternative B would disturb 4% of the analysis area, which would further fragment and degrade the species' remaining mapped habitat and dispersal areas in the analysis area. Effects from Alternatives B, C, D, and E would be similar and would be reduced under the Preferred Alternative.

3.11.2.3 Significance Determination

Under all action alternatives, potential adverse effects to St. Anthony sand dune tiger beetles would not be significant. All action alternatives would have adverse effects on individual St. Anthony sand dune tiger beetles and suitable habitats through habitat alteration and loss (from work areas and placement of infrastructure and dune stabilization from expansion of nonnative vegetation) and injury or mortality (vehicle strikes and crushing of individuals by workers or construction equipment). If suitable habitats are not wholly avoided, less than 0.26% would be affected by any alternative. These effects would occur during the life of the project but most of the existing tiger beetle habitat would be unaffected by the project, and the small number of individuals that may be killed would not likely result in a trend toward federal listing under the ESA or a loss of population viability.

3.11.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would have irretrievable effects on individual St. Anthony sand dune tiger beetles and suitable habitats through habitat alteration and loss and injury or mortality. These effects would occur during the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) but would not be considered irreversible because most of the existing tiger beetle habitat would be unaffected by the project.

3.11.2.5 Compensatory Mitigation

With the implementation of applicant-committed measures and additional mitigation, including avoidance of occupied habitat (see EIS Appendix 4), impacts to St. Anthony sand dune tiger beetle would be largely minimized or avoided. If during site-specific project design the BLM and MVE determine complete avoidance of potential habitat is not feasible, compensatory mitigation measures (see Table App4-5 in EIS Appendix 4) would be warranted and could include the following:

- **Measure II:** Purchase or acquire through exchange lands with existing tiger beetle habitats or dunes occurring on private or state lands. Opportunities would occur off-site, such as the dune areas north of Lake Walcott between Rupert and American Falls, Idaho.
- **Measure III:** Treat noxious or invasive weeds (i.e., cheatgrass, Russian thistle, others) in or adjacent to dunes/dune complexes to reduce undesirable/nonnative vegetation cover on dunes.
- **Measure IV:** Where dunes have been previously stabilized by perennial grass seedings, consider chemical treatment or other disturbance to reduce grass cover to foster tiger beetle habitat and restore the natural integrity of dune complexes.

3.11.3 Monarch Butterfly

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.11-7.

Table 3.11-7. Analysis Approach for Monarch Butterfly

Issue Analyzed in Detail	How would the project affect monarch butterfly habitat and population?
Associated Issues Analyzed in Brief	AIB-41: Would project ground disturbance cause the introduction and spread of weeds and other invasive plant species? How would the introduction of weeds and invasive plant species affect revegetation success? AIB-42: How would project ground disturbance affect vegetation cover? AIB-52: How would project construction and operation affect riparian habitats? AIB-59: Would dust from project roads affect vegetation, wildlife, and invertebrates?
Analysis Area	Same as described for pollinators (Section 3.11.1) and comprises the siting corridors where habitat alteration would occur as a result of the project.
Indicators	Acres of ground disturbance in suitable monarch butterfly breeding habitat. Miles of new and improved access roads in suitable monarch butterfly breeding habitat.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years from final reclamation for grasslands, as described in Section 3.15.1 [Native Upland Vegetation Communities]), estimated to last approximately 39 to 41 years.
Data Sources	Project baseline reports for vegetation communities (WEST 2020a, 2021). LANDFIRE data (USGS and DOA 2013). Modeled milkweed distribution (IDFG 2019). Monarch Milkweed Mapper (The Xerces Society et al. 2022). Available literature.

3.11.3.1 Affected Environment

In December 2020, the monarch butterfly was given candidate status for listing under the ESA. The western North American population of monarch butterfly (occurring west of the Rocky Mountains) has experienced gradual population declines over the past 24 years (USFWS 2020). Loss of breeding habitat (milkweed [*Asclepias* spp.] host plants) is a significant factor contributing to this decline (USFWS 2020).

The monarch butterfly is a migratory species, and seasonal patterns in Idaho include adult arrival (early June), peak egg observation (mid-June), and peak adult observation (late July) before migrating again in the fall (Waterbury et al. 2019). Idaho does not host overwintering or resident populations of monarchs, and presence is limited to the migratory breeding population. Migratory individuals in western North America generally fly south and west to overwintering groves along the California coast into northern Baja California, Mexico. Although monarch larvae are specialists with respect to host plant use, adult monarchs are nectar generalists, feeding on a variety of flowering plants (Brower et al. 2006). An overlap in timing of both monarchs and nectar plants and milkweed is important for monarch survival, as well as the position of these resources on the landscape. In western North America, nectar and milkweed resources are often associated with riparian corridors (Brower et al. 2006; Brower et al. 2015; Dingle et al. 2005). Monarchs tagged in Boise, Idaho, have been recorded in Orem, Utah, and monarchs tagged in Ventura, California, have been recorded in Providence, Utah (The Xerces Society 2021a), which may indicate that migration occurs through the region where the project is located. Monarch sightings in the region are rarely reported, and available documentation relies largely on citizen scientists and therefore is unlikely to accurately represent true population numbers (The Xerces Society 2021a, 2021b; The Xerces Society et al. 2022). No species-specific surveys have been conducted in the siting corridors. The species is assumed to be present in the analysis area from early June through the fall, during which both migration and breeding may occur. Figure 3.11-4 shows suitable monarch butterfly breeding habitat in the analysis area.

Recent research in Idaho (Waterbury et al. 2019) identified key monarch breeding habitats as moist-soil sites within matrices of grasslands, wetlands, deciduous forest, and shrub-steppe supporting large, contiguous, and high-density milkweed stands. The research also identified co-occurrence of showy milkweed (*Asclepias speciosa*) and swamp milkweed (*A. incarnata*) as important indicators of productive monarch breeding habitat. Showy milkweed is common along ditch banks and in pastures throughout Idaho. Swamp milkweed is more limited in distribution than showy milkweed and grows in wetter areas along riverbanks and pond shores in southwest Idaho. Narrow-leaf milkweed (*A. fascicularis*) is also common across western Idaho, but it is more common in dry sunny areas of the valleys and foothills. Narrow-leaf milkweed is also less often used for egg-laying by monarchs than showy milkweed or swamp milkweed (NRCS 2018).

Milkweed habitat suitability research indicates that sagebrush-steppe habitats in Idaho exhibit low suitability as milkweed or breeding monarch habitats, whereas agricultural lands may provide excellent milkweed and breeding monarch habitat (Waterbury et al. 2019). In southern Idaho, this has been largely identified as either irrigated agriculture or areas actively managed for wildlife habitat with indirect supplemental watering that supports moist-soil conditions. For irrigated agricultural lands, the combination of season-long availability of water and intermittent disturbance from canal maintenance, mowing, or tilling facilitates rapid colonization by showy milkweed (Waterbury et al. 2019). The IDFG used the distribution of milkweed habitat (specifically showy and swamp milkweed habitat), which predominantly occurs at lower elevations near perennial water, to model the distribution of potential monarch habitat in Idaho (IDFG 2019). This modeling indicates that approximately 3,131 acres (3.7%) of the siting corridors are suitable monarch habitat and 395 acres (0.5%) of the siting corridors represent optimal monarch breeding habitat (IDFG 2019). Suitable and optimal habitat was delineated based on expert-opinion-based probability thresholds of 0.399 and 0.7, respectively (IDFG 2019). Milkweed-specific surveys were not conducted in the siting corridors; however, milkweed was recorded incidentally during project surveys for BLM special-status plants. Although showy milkweed was not observed in any of the survey transects, it was occasionally observed along the perimeter of agricultural fields located outside the siting corridors (McCormack 2021).

Monarch migratory habitat is characterized by seasonal availability of nectaring plants. Nectaring plants are limited in quantity and richness, particularly in late summer, and include some nonnative, invasive species that may be present in the siting corridors (though surveys were not conducted). Of the native plants observed in Idaho, common sunflower (*Helianthus annuus*) and goldenrods *Solidago* spp., *Euthamia* spp.) were frequently visited by nectaring monarchs. Monarchs were also documented nectaring from nonnative plants, including bull thistle (*Cirsium vulgare*) and Canada thistle (*Cirsium arvense*), which may provide late-season nectar resources when native plant nectar resources are limited (Waterbury et al. 2019).

Based on habitat requirements for the breeding and migratory life cycle of the monarch butterfly and results of modeled breeding habitat suitability, the analysis area may provide suitable nectaring habitat for the species and limited areas of suitable breeding habitat. Given the relatively small proportion of suitable breeding habitat, the analysis area is unlikely to support dense populations of milkweed that could provide high-quality breeding habitat for large numbers of monarch butterfly. However, because these milkweed-supporting conditions are rare across the landscape, these proportionally small areas may offer regionally important breeding habitat for monarch butterfly. Nectaring habitat may be present across all vegetation communities in the analysis area.

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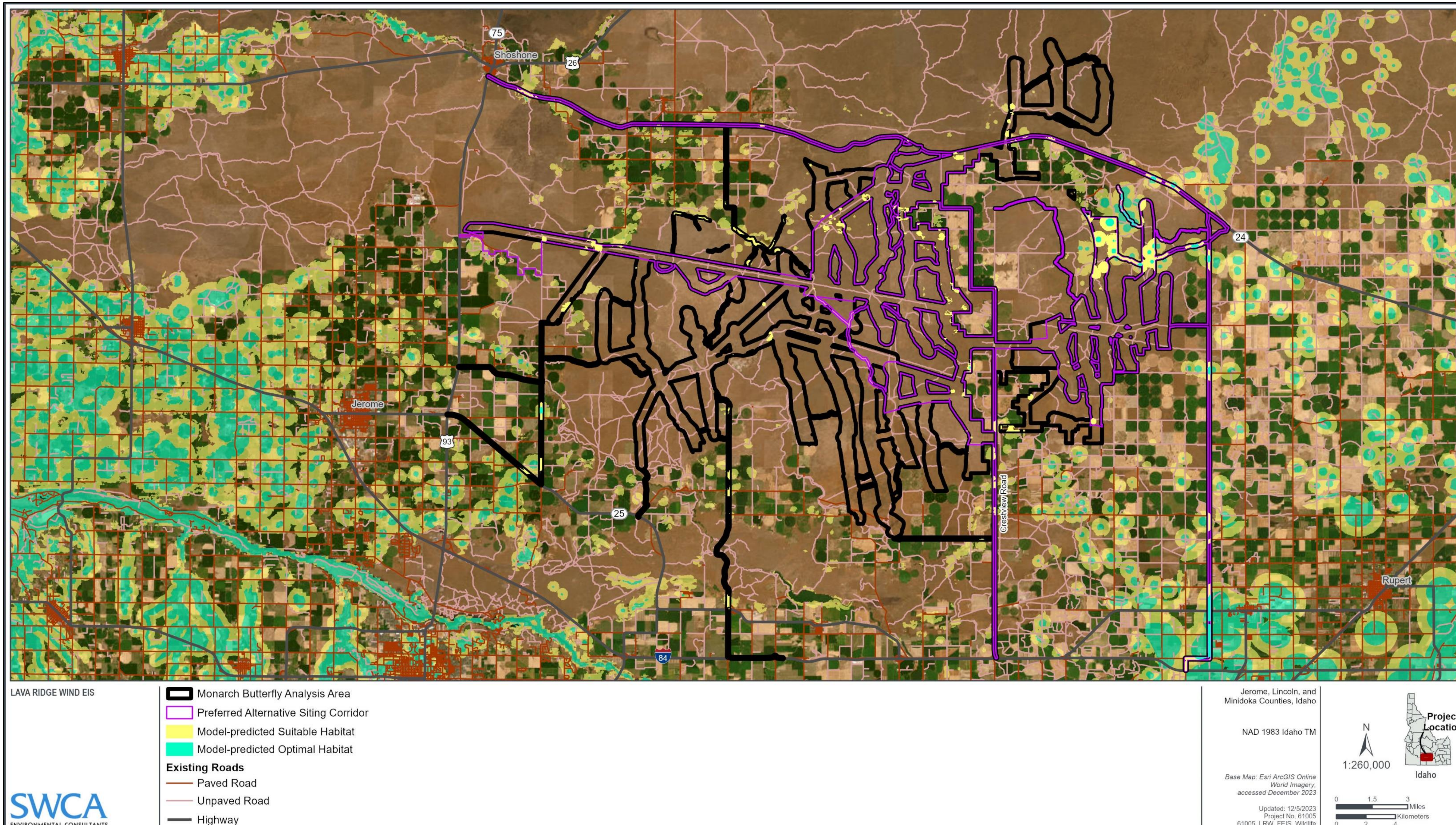

Figure 3.11-4. Monarch butterfly suitable breeding habitat in the analysis area.

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3.11.3.1.1 EXISTING AND FUTURE TRENDS AND PLANNED ACTIONS

Existing and future trends and actions that have influenced and will continue to influence both nectaring and monarch butterfly breeding habitat in the analysis area would be similar to that discussed for pollinators (see Section 3.11.1.1 [Pollinators, Affected Environment]). Approximately 884 acres (28%) of suitable and 196 acres (50%) of optimal breeding habitat have been affected by invasion of nonnative species, agriculture, development (including roads), or will be affected by planned renewable energy projects. An additional 2,021 acres (65%) of suitable and 137 acres (35%) of optimal breeding habitat have been affected by wildfires, past vegetation treatments, and seeding projects. This includes 1,448 acres (46%) of suitable breeding habitat and 111 acres (28%) of optimal breeding habitat that have been seeded. Most seeding projects (which typically include native flowering species that can be a nectaring resource) overlap with the areas affected by wildfire and past vegetation treatments; habitat conditions for monarch butterfly are expected to improve in the areas as vegetation becomes established. Overall, 74% of suitable habitat and 78% of optimal breeding habitat have been or will be affected by existing and future trends and actions. Conservation efforts to enhance and maintain monarch butterfly habitat in the western United States are ongoing. The *Western Monarch Butterfly Conservation Plan* (Western Association of Fish and Wildlife Agencies 2019) outlines a conservation strategy, including in Idaho, that identifies a shared set of coordinated, ecosystem-based conservation strategies across all partner agencies to achieve a viable western monarch population in order to preclude the need to list the monarch butterfly under the ESA. With the exception of habitat modeling (IDFG 2019), no conservation actions described in the *Western Monarch Butterfly Conservation Plan* have been implemented within the analysis area.

3.11.3.2 Impacts

3.11.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and monarch butterfly would only be affected by existing and future trends and actions.

3.11.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect monarch butterfly breeding habitat and populations through habitat alteration and loss (from work areas and infrastructure) and injury or mortality (vehicle strikes, collision with turbine blades, and application of herbicides or pesticides).

Habitat Alteration and Loss

General effects to monarch butterfly nectaring habitat would be similar to those described in Section 3.11.1 (Pollinators). Up to 32 acres of optimal monarch breeding habitat and 251 acres of suitable monarch breeding habitat could be disturbed in project work areas (Table 3.11-8; see Figure 3.11-4). Up to 11 acres of optimal monarch breeding habitat and 88 acres of suitable monarch breeding habitat could be replaced by project infrastructure for the life of the project. Overall, this would be about 11% of the available monarch butterfly breeding habitat in the analysis area (both optimal and suitable).

If project ground disturbance removes or destroys plants that may provide suitable breeding resources (specifically, showy and swamp milkweed), the resulting loss of suitable breeding habitat for monarch butterfly would be commensurate with loss of individual plants and/or suitable conditions for milkweed plants. Since project infrastructure would be sited to avoid wetlands to the extent practicable (a 100-foot no-ground-disturbance buffer would be applied to wetlands, streams, and riparian areas, applicant-committed measure 133) and because a key characteristic of monarch breeding habitat is moist soils, potential impacts to breeding habitat would be minimized but not completely eliminated. Where impacts on wetlands would not be avoidable, site-specific crossing plans and measures to mitigate impacts would be submitted to the appropriate regulatory agency (applicant-committed measure 120).

In addition, applicant-committed measures to prevent the introduction or spread of weeds and nonnative species (measures 97 to 105), including implementation of a Noxious Weed Management Plan (Appendix R of MVE [2023]), would also minimize the potential for the project to degrade monarch habitat. These measures include the use of weed-free seed mixes and mulch, cleaning of vehicles and machinery, and the use of a BLM-approved herbicide plan. MVE would restore ground disturbance areas using native seed mixes that incorporate pollinator plant species (applicant-committed measure 99). Interim reclamation would be irrigated if necessary for establishing seedlings more quickly. Mulching techniques would be used to expedite reclamation and to protect soils (required mitigation measure Q). Reclamation areas would be monitored until the success criteria is met or up to 5 years following the initial or additional reclamation activities (applicant-committed measure 164). These plans and measures would help reduce but not eliminate the potential localized impacts on monarch.

Implementation of these measures would reduce but not eliminate the potential localized impacts on suitable monarch breeding habitat.

Injury or Mortality

As described in Section 3.11.1 (Pollinators), Alternative B would increase the risk for direct mortality of flying insects through collisions with turbine blades and vehicle strikes. Though studies of the typical flight altitude of migrating monarch butterflies are lacking (they have been observed by glider pilots between approximately 2,000 and 11,000 feet [Gibo 1981]), the species may be more susceptible than other insects to collisions with turbine blades as a result of generally higher flight heights (either while gaining or losing altitude). Migratory flight heights observed in Gibo (1981) may be higher than maximum turbine blade height, which would reduce the risk of collision with turbine blades for individuals migrating at high elevations across the siting corridors.

Since roadside habitat may provide higher quality nectaring habitat for monarch butterflies as a result of increased vegetation density, the species may also be more susceptible to collisions with vehicles than other pollinators. A 1998 study in Illinois found peak mortality of monarch butterflies from road traffic coincided with late-summer breeding and the onset of autumn migration (McKenna et al. 2001). Mortality would be commensurate with the volume of traffic (see EIS Tables 2.4-1 and 2.4-3) and season of use along each road. Less than 1 mile of new and 21 miles of improved access roads would be constructed in optimal monarch habitat, where breeding and/or nectaring monarch may be more prevalent, and 12 miles of new and 6 miles of improved access roads would be constructed in suitable monarch habitat (see Table 3.11-8).

The number, size, and length of roads would be minimized to the extent feasible (applicant-committed measure 4). Carpooling among construction workers would be encouraged to the extent practical in order to reduce the number of vehicles entering and exiting the site on a daily basis (applicant-committed measure 40). Fewer vehicles would decrease the potential for monarch collisions with vehicles; the extent to which this would occur would be commiserate with the actual reduction in vehicle traffic.

Monarch butterfly would also be susceptible to mortality from application of herbicides and pesticides, similar to pollinators (see Section 3.11.1 [Pollinators]).

As discussed in EIS Section 3.3.1 (Bat Populations and Roosting Habitat) and Section 3.11.1 (Pollinators), mitigation measures to site turbines to minimize impacts to bats (applicant-committed measures 136 and 138) could also reduce the risk of mortality for monarch butterfly by siting turbines at least 100 feet from wetlands and 1,000 feet from irrigation canals.

Table 3.11-8. Summary of Impacts to Monarch Butterfly

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres ground disturbance in modeled monarch breeding habitat (percentage total modeled habitat in analysis area)	**Work areas:** 32 acres optimal 250 acres suitable	**Work areas:** 30 acres optimal 234 acres suitable	**Work areas:** < 1 acre optimal 89 acres suitable	**Work areas:** 28 acres optimal 210 acres suitable	**Work areas:** 30 acres optimal 208 acres suitable
	Infrastructure: 11 acres optimal 88 acres suitable	**Infrastructure:** 11 acres optimal 83 acres suitable	**Infrastructure:** < 1 acre optimal 27 acres suitable	**Infrastructure:** 11 acres optimal 79 acres suitable	**Infrastructure:** 8 acres optimal 59 acres suitable
	Total: 381 acres (11%)	**Total: 358 acres (10%)**	**Total: 116 acres (3%)**	**Total: 328 acres (9%)**	**Total: 305 acres (9%)**
Miles new and improved access roads in modeled monarch breeding habitat	**New road:** < 1 mile optimal 12 miles suitable	**New road:** < 1 mile optimal habitat 11 miles suitable habitat	**New road:** 0 mile optimal habitat 4 miles suitable habitat	**New road:** < 1 mile optimal habitat 11 miles suitable habitat	**New road:** < 1 mile optimal habitat 10 miles suitable habitat
	Improved road: 6 miles optimal 21 miles suitable	**Improved road:** 5 miles optimal 18 miles suitable	**Improved road:** 0 mile optimal 9 miles suitable	**Improved road:** 5 miles optimal 16 miles suitable	**Improved road:** 5 miles optimal 15 miles suitable
	Total: 39 miles	**Total: 34 miles**	**Total: 13 miles**	**Total: 33 miles**	**Total: 31 miles**

Source: IDFG (2019).

Alternative B with Additional Measures

Implementation of phased construction would reduce potential impacts on nectaring and breeding habitat by limiting disturbance to these habitats; however, the phased construction would result in an additional year of surface-disturbing construction activities. Concentrating construction activities within these subphase areas would allow for monarch to use habitats outside of the subphase area within which construction is occurring in a single year. As a result, construction activities would occur for 3 years under this alternative, although activities would occur at a lower intensity (due to less construction personnel present and less equipment operating at any one time) and in more localized areas than the other action alternatives. Monarch would experience a lesser degree of habitat loss and risk of injury or mortality from construction activities each year during construction and decommissioning.

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for monarch butterfly are summarized in Table 3.11-9 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.11-9. Mitigation for Monarch Butterfly

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
4	Q	a
40	–	l
97–105	–	kk–ll
120	–	oo–pp
133	–	zz
136	–	aaa–ccc
138	–	nnn–ooo
164	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to monarch butterfly under Alternative B in addition to those described in Section 3.11.1.2.2 by requiring avoidance and minimization measures be applied throughout the life of the project and by reducing the need for herbicide applications by minimizing the potential for introduction and spread of invasive plant species, which may degrade pollinator habitat. Avoidance of insecticides and pesticides would limit the sources of project-related mortality for pollinators. Habitat restoration efforts that incorporate monarch conservation recommendations, such as using seed mixes that would ensure at least three different flowering plant species are blooming during the growing season, would maintain or improve habitat for monarch butterfly within disturbed areas. However, the potential for vehicle strikes would be increased because traffic volume would be higher overall (see EIS Tables 2.4-1 and 2.4-3) due to the increased duration of the construction phase (3 years instead of 2).

3.11.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B with Additional Measures (see Table 3.11-8). Traffic volume and the associated potential for vehicle strikes would be slightly greater than Alternative B but slightly less than Alternative B with Additional Measures (see EIS Tables 2.4-1 and 2.4-3).

3.11.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D (see Table 3.11-8) would be greatly reduced when compared to Alternatives B and C because Alternative D would eliminate most siting corridors east of Crestview Road to reduce development in areas that have higher sagebrush cover. The eliminated siting corridors contain additional areas with a high proportion of monarch optimal and suitable breeding habitat, and as a result there would be less acres of breeding habitat loss and alteration because there would be less ground disturbance compared to the other action alternatives. Traffic volume under Alternative D would be the lowest of the action alternatives (see EIS Tables 2.4-1 and 2.4-3), which would reduce the risk of direct mortality of monarch individuals. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures.

3.11.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to Alternative B, though the magnitude of impacts would likely be reduced due to reduced traffic volume (see Table 3.11-8).

3.11.3.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to Alternatives B and E, though the magnitude of impacts would likely be reduced due to less miles of new access roads and reduced traffic volume (see Table 3.11-8).

3.11.3.2.7 CUMULATIVE IMPACTS

As described in Section 3.11.1.1 (Pollinators, Affected Environment), the majority of modeled monarch butterfly breeding habitat in the analysis area has already been or would be impacted by human development, the invasion of nonnative plants, past vegetation treatments, and wildfire, and may no longer provide quality native habitat for monarch butterflies. Alternative B, Alternative C, Alternative E, and the Preferred Alternative would disturb similar amounts (11%, 10%, 9%, and 9%, respectively) of optimal and suitable breeding habitat in the analysis area. Some of these disturbed areas may be currently impacted by existing and future trends and actions. Additional levels of disturbance related to development of the project under these four alternatives would further fragment and degrade the remaining monarch butterfly breeding habitat in the analysis area. Alternative D would disturb 3% of optimal and suitable breeding habitat in the analysis area, which would have a smaller contribution to cumulative habitat fragmentation and degradation affects when compared to the other action alternatives.

3.11.3.3 Significance Determination

Under all action alternatives, potential adverse effects to monarch butterfly would not be significant. All action alternatives would have adverse effects on monarch butterfly breeding habitat and populations through habitat alteration and loss (from work areas and infrastructure) and injury or mortality (vehicle strikes, collision with turbine blades, and application of herbicides). Habitat alteration and loss effects in the analysis area would last the life of the project until final reclamation. Injury or mortality effects would occur during the life of the project. Implementation of preconstruction surveys to identify, and subsequently avoid disturbance of, milkweed (see Table 3.11-9) would reduce the potential for significant adverse effects to monarch butterfly to occur.

3.11.3.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would have irretrievable effects on monarch butterfly breeding habitat and populations through habitat alteration and loss and injury or mortality. Habitat alteration and loss effects would last up to 39 to 41 years, which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years for perennial grasslands to reestablish after final reclamation. Injury or mortality effects would occur during the life of the project. Additional irreversible effects would occur post-project in areas where very fragile soils are disturbed and reclamation potential is limited, where concrete foundations remain following decommissioning, and where the BLM may choose to leave roads in place (as described in Section 3.15.1.3 [Native Upland Vegetation Communities]) resulting in permanent habitat loss.

3.11.4 Bureau of Land Management Special-Status Bumble Bees

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.11-10.

Table 3.11-10. Analysis Approach for BLM Special-Status Bumble Bees

Issue Analyzed in Detail	How would the project affect western bumble bee (*Bombus occidentalis*) and Suckley's cuckoo bumble bee (*Bombus suckleyi*) habitat and populations?
Associated Issues Analyzed in Brief	Same as pollinators (see Section 3.11.1)
Analysis Area	Same as for pollinators (see Section 3.11.1): the siting corridors where ground disturbance or vegetation removal would occur as a result of the project.
Indicators	Qualitative discussion of species-specific impacts to nesting habitat
Impacts Duration	Same as pollinators (see Section 3.11.1)
Data Sources	See affected environment discussion (Section 3.11.4.1).

3.11.4.1 Affected Environment

Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones (The Xerces Society et al. 2022). Bumble bees, including western bumble bee and Suckley's cuckoo bumble bee, are present year-round across most of Idaho and require habitats with continuous availability of pollen resources during the colony's active period (generally February to late November) (Hatfield and Lebuhn 2007). Early spring and late fall are often periods with lower floral resources; the presence of flowering plants at these critical times is essential. The amount of pollen resources directly affects the number of new queens that a colony can produce, and because queens are the only type of bumble bees that can form new colonies, pollen availability directly influences the future bumble bee population size. Western bumble bee nests underground, typically in abandoned rodent nests located just below the surface (Elliott 2009; Thorp et al. 1983). Availability of suitable nesting habitat may be limited by rodent abundance (Evans et al 2008). Little is known about the overwintering sites used by new western bumble bee queens, though bumble bees generally hibernate close to the ground surface at sites that are undisturbed and have adequate organic material to provide shelter (Williams et al. 2014).

Western bumble bee has declined over much of its range (Evans et al. 2008). The Xerces Society now considers the species in steep decline (The Xerces Society et al. 2023), and it is currently under review for listing under the ESA. The major decline of the western bumble bee is largely associated with presence of the parasite *Nosema bombi* (Cameron et al. 2016), which nearly wiped out commercial hives in the United States, leading to the cessation of commercial production of western bumble bee (Flanders et al. 2003). The temporal connection between *Nosema* epizootics in commercial bumble bee stocks and increased prevalence in wild populations suggest a substantial risk of pathogen transmission with domestication (Cameron et al. 2016). Insecticides and herbicides both pose threats to bumble bees, particularly neonicotinoids. Neonicotinoids are a class of systemic insecticides whose toxins are extraordinarily persistent and are expressed in the nectar and pollen of plants, and can have lethal and sublethal effects on bumble bees (Colla and Packer 2008; Gill et al. 2012; Gill and Raine 2014; Hopwood et al. 2012; Laycock et al. 2014; Whitehorn et al. 2012).

In addition to disease, western bumble bee populations have experienced habitat loss and alteration due to agricultural and urban development, conifer encroachment, grazing, and climate change (Evans et al. 2008). Bumble bee habitat can be affected by livestock grazing if grazing removes floral resources (Hatfield et al. 2012), if livestock trample nesting and overwintering sites, or if grazing disrupts rodent populations, which can change the availability of bumble bee nesting sites.

Recent research indicates that populations of western bumble bee have lower genetic diversity compared to populations of co-occurring stable species (Cameron et al. 2011; Lozier et al. 2011). Since this species has undergone a dramatic decline in range and relative abundance, reduced genetic diversity and susceptibility to pathogens (Whitehorn et al. 2009) make this species vulnerable to extinction (Zayed 2009).

Suckley’s cuckoo bumble bee is an obligate social parasite of other *Bombus* species. Suckley’s cuckoo bumble bee has been documented breeding only in colonies of *B. occidentalis* (Thorp et al. 1983) but has been recorded at colonies of other bumble bee species (Williams et al. 2014). All individual female Suckley’s cuckoo bumble bees can reproduce, but because this species is unable to produce a worker caste, is unable to produce enough wax for nest construction, and has no pollen-collecting basket on its hind legs, it cannot provision its own offspring. To reproduce, a female must enter a host colony, kill or subdue the host queen, lay her own eggs, and control the workers to continue collecting resources to provision her offspring (Lhomme and Hines 2018). Therefore, the population size and distribution of Suckley’s cuckoo bumble bee are likely directly linked to that of the western bumble bee. A targeted survey for Suckley’s cuckoo bumble bee in Lemhi and Custer Counties, Idaho, in 2018 and 2019 did not document any observations despite visits to historic Suckley’s sites (Baumann and Schuldt 2019). However, the species has been recently recorded in Boundary County, Idaho (Cornelisse and Tyler 2020). There are no historic or current records of either species in Jerome, Minidoka, and Lincoln Counties (IDFG 2022), though the area has not been systematically surveyed.

3.11.4.1.1 EXISTING AND FUTURE TRENDS AND PLANNED ACTIONS

The existing and future trends and planned actions in the analysis area that may affect BLM special-status bumble bees are the same as those described in Section 3.11.1.1 (Pollinators, Affected Environment), with the exception of recent conservation efforts, described here.

Conservation efforts for special-status bumble bees in the western United States are ongoing, including in Idaho. Currently, a citizen science effort called the "Pacific Northwest Bumble Bee Atlas" has been initiated in the Pacific Northwest to track and conserve bumble bees of Oregon, Washington, and Idaho, with the intention of collecting information about the distribution and important habitat features for these species to inform future conservation efforts (Washington Department of Fish and Wildlife et al. 2023).

3.11.4.2 Impacts

3.11.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and BLM special-status bumble bees would only be affected by existing and future trends and actions.

3.11.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect BLM special-status bumble bees through habitat alteration and loss (from work areas and infrastructure) and through displacement, injury, or mortality (vehicle strikes, collision with turbine blades, and application of herbicides or pesticides, removal of vegetation).

Since BLM special-status bumble bees are habitat generalists, effects to their foraging resources and habitats as well as the potential for injury and mortality would be similar to those described in Section 3.11.1 (Pollinators); however, because of the reduced genetic diversity of these species, loss of foraging resources may further isolate existing populations and result in reduced gene flow between isolated populations. Avoidance and minimization measures would be the same as those described in Section 3.11.1. A qualitative discussion of species-specific impacts to nesting habitat for BLM special-status bumble bees in the analysis area is discussed in detail here.

If project ground disturbance removes or destroys existing nests or rodent burrows that provide suitable nesting habitat, the resulting impacts to BLM special-status bumble bees would be commensurate with the number and size of nests or suitable habitat lost. In addition, if nesting bumble bees are present during ground disturbance, entire colonies could be directly crushed by equipment and vehicles. Since each colony can contain as many as 1,700 workers and produce up to 360 new queens (Macfarlane et al. 1994), loss of colonies would have localized effects on bumble bee populations and general abundance and/or contribute to increased isolation between existing populations and reduced gene flow.

Implementation of applicant-committed measures and measures required by BLM policy described for pollinators would reduce but not eliminate the potential localized impacts on suitable nesting habitat for bumble bees.

Alternative B with Additional Measures

Implementation of phased construction would reduce potential impacts on nesting habitat by limiting disturbance to these habitats; however, the phased construction would result in an additional year of surface-disturbing construction activities. Concentrating construction activities within these subphase areas would allow for nesting special-status bumblebees to use habitats outside of the subphase area within which construction is occurring in a single year. As a result, construction activities would occur for 3 years under this alternative, although activities would occur at a lower intensity (due to less construction personnel present and less equipment operating at any one time) and in more localized areas than the other action alternatives. Special-status bumblebees would experience a lesser degree of habitat loss and risk of mortality from construction activities each year during construction and decommissioning.

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for BLM special-status bumble bees are summarized in Table 3.11-11 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.11-11. Mitigation for BLM Special-Status Bumble Bees

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	Q	a
4	–	l
20–24	–	kk–ll
40	–	oo–pp
100–112	–	aaa–ddd
136	–	nnn–ooo
138	–	–
163	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to bumble bees by requiring avoidance and minimization measures be applied throughout the life of the project and reducing the need for herbicide applications by minimizing the potential for introduction and spread of invasive plant species, which could degrade bumble bee habitat. Avoidance of insecticides and pesticides would limit the sources of project-related mortality for bumble bees. Incidental surveys for the presence of sensitive pollinators (measure ddd) would inform the need for implementation of best management practice to reduce potential impacts to bumble bees. Habitat restoration efforts that incorporate bumble bee conservation recommendations, such as scattering slash and maintaining undisturbed naturally occurring bare ground (measure ll), would maintain or improve habitat for special-status bumble bee within disturbed areas.

3.11.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B with Additional Measures, though the magnitude of effects would likely be reduced. Since Alternative C would reduce the overall area of potential ground disturbance, the risk of disturbing or destroying existing nests (including direct mortality of colonies) and suitable nesting habitat for BLM special-status bumble bees would be reduced compared to Alternative B.

3.11.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative C, though the magnitude of impacts would likely be reduced since Alternative D would also eliminate the majority of siting corridors east of Crestview Road to reduce development in areas that have higher sagebrush cover, which may provide more high-quality native habitat.

3.11.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to Alternative C, though the magnitude of impacts would likely be reduced.

3.11.4.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to Alternative D, though the magnitude of impacts would likely be further reduced. Effects from the phased construction schedule would be similar to Alternative B with Additional Measures. Since the Preferred Alternative would involve the least ground disturbance of the action alternatives, the risk of disturbing or destroying existing nests (including direct mortality of colonies) and suitable nesting habitat for BLM special-status bumble bees would be the least of the action alternatives.

3.11.4.2.7 CUMULATIVE IMPACTS

Cumulative impacts to BLM special-status bumble bees are the same as those discussed in Section 3.11.1.2.7 (Pollinators, Cumulative Impacts).

3.11.4.3 Significance Determination

Under all action alternatives, potential adverse effects to BLM special-status bumble bees would not be significant and are the same as those discussed in Section 3.11.1.3 (Pollinators, Significance Determination).

3.11.4.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Irreversible and irretrievable effects to BLM special-status bumble bees are the same as those discussed in Section 3.11.1.4 (Pollinators, Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity).

3.12 RECREATION

3.12.1 Hunting and Trapping Access and Opportunities

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.12-1.

Table 3.12-1. Analysis Approach for Hunting and Trapping Access and Opportunities

Issue Analyzed in Detail	How would the project affect hunting and trapping access and opportunities, and how would changes in hunting and trapping access and opportunities affect the existing BLM-permitted hunting outfitter?
Associated Issues Analyzed in Brief	AIB-25: How would the project affect dispersed recreational opportunities and setting for activities such as driving for pleasure, photography, dispersed camping, horseback riding, hiking, wildlife viewing, photography, and winter recreation? AIB-26: How would the project impact public motorized access? AIB-27: How would the project impact special recreation management areas (SRMA) and the recreational opportunities for which these areas were established? AIB-28: How would the project's increased motorized access affect recreational uses of cave resources? AIB-29: How would the project contribute to changes or degradations to resources that would affect hunting spending? AIB-54: How would changes in hunter access via new or improved roads affect big game populations?
Analysis Area	The two IDFG GMUs where hunting access and acres of land would be changed as a result of the project. These units are GMUs 52A and 53 (Figure 3.12-1), which collectively encompass 2,287.778 acres.
Indicators	Change in linear miles of public motorized roads in affected game management units (GMUs). Change in acres of lands or routes available for hunting outfitters' use, including changes in the quality of the area relative to the permitted use areas. Changes to game species populations or distribution in the analysis area (as summarized in EIS Section 3.18.2 [Big Game Habitats and Populations]).
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	IDFG harvest statistics and hunt planning data, because the IDFG and BLM cooperatively manage wildlife tracts (IDFG 2020, 2021a, 2021b). BLM Burley Field Office information for the existing permitted hunting outfitter in the analysis area.
Assumptions	During the up-to-3-year construction and up-to-3-year decommissioning phases, public access to siting corridors could be restricted for public safety. As construction shifts across the analysis area, roads in the siting corridors may be unavailable for hunting, trapping, and OHV use. Although MVE (2023) states that the duration of public access restrictions in the siting corridors would be minimized wherever possible (e.g., on access roads), those details cannot be known at this time. Therefore, this analysis assumes there would be temporary public access restrictions during construction. All new and improved access roads that are established during construction would remain during project operation. Although MVE (2023) states that some access roads established for use during construction would be evaluated for closure and reclamation at the conclusion of construction, those details cannot be known until after construction. Therefore, this analysis assumes all access roads would remain postconstruction.

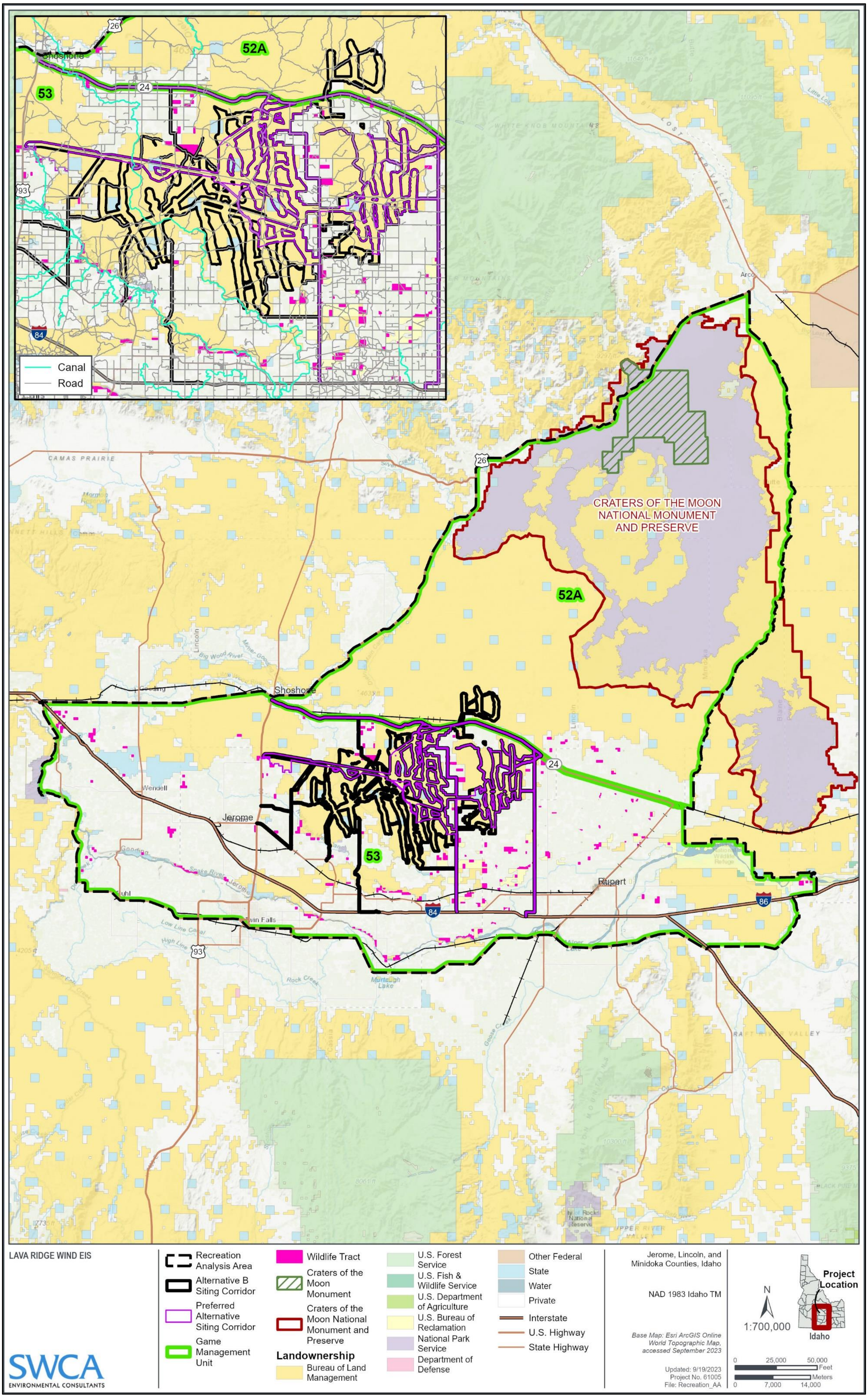

Figure 3.12-1. Game management units in the hunting and trapping access and opportunities analysis area.

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3.12.1.1 Affected Environment

The project's siting corridors are in IDFG Units 52A and 53. Unit 52A is located north of ID 24 in IDFG Region 6 (Upper Snake Region). Unit 53 is south of ID 24 in IDFG Region 4 (Magic Valley Region). IDFG manages hunting seasons; controlled hunts; harvest restrictions; and issuance of resident and non-resident license, tags, and permits. Hunting and trapping access and opportunities in both units include general season and controlled hunts for big game species (deer, elk, pronghorn, mountain lion, and wolf), upland bird species (quail, chukar, crow, dove, gray partridge, sage-grouse, and pheasant), small game (rabbit, hare, squirrel, and furbearer), and waterfowl species (goose, duck, coot, and snipe). There is one hunting outfitter with a BLM Special Recreation Permit that guides in Unit 52A, including portions of the siting corridors (Freiberg 2020a). The outfitter also guides in Units 46, 47, 54, 55, 56, 57, and 68.

Unit 52A is approximately 1.1 million acres and consists mostly of BLM public lands (55%) and NPS (34%) lands. NPS lands in the CRMO National Monument boundary in Unit 52A are closed to hunting (53,545 acres; see Figure 3.12-1), whereas the remainder of NPS lands outside the CRMO National Monument are open to hunting. The remainder of Unit 52A is NPS preserve, BLM, or BOR public lands; state lands; or private land. In total, there are 961,379 acres of public lands open to hunting in Unit 52A. Unit 53 is approximately 1.2 million acres and consists of private lands (64%) and BLM public land (29%). The remainder of Unit 53 is BOR, NPS, USFWS, state, or other lands. In total, there are 422,735 acres of public lands open for hunting in Unit 53. Unit 52A has more contiguous public lands available for hunting than Unit 53, which includes more agricultural, rural residential, and developed private lands in comparison.

The project's siting corridors are on approximately 5,191 acres of public lands (BLM public lands) in Unit 52A and 78,860 acres of public lands (BLM and BOR public lands and state lands) in Unit 53. All public lands in the siting corridors are open to hunting, and there are no restricted hunting areas. Motorized vehicle use during hunting is limited to existing established and open roads. There are approximately 401 linear miles of existing motorized roads (including both paved and unpaved motorized roads) in the siting corridors and no seasonal motorized road closures. Most existing motorized roads in the siting corridors are in Unit 53 (363 miles), and the remaining 38 miles are in Unit 52A. During snow cover, generally in the winter outside of the fall hunting season, some roads may be impassible by passenger vehicles and light-duty trucks, whereas other roads are passable year-round. Winter motorized use in the siting corridors by snowmobile and all-terrain or OHVs is low (Freiberg 2020b).

Fall big game hunting for mule deer, elk, and pronghorn is popular in the siting corridors. Rare opportunities for trophy mule deer have been known to occur. Furbearer trapping (primarily for bobcat and coyote) also occurs in the analysis area; bobcat trapping season is in the winter, and trapping of coyote is allowed year-round (IDFG 2021a). To a lesser extent, waterfowl hunting occurs along the canals in the siting corridors (Freiberg 2020b). Deer and elk populations in Units 52A and 53 are typically small and actively managed (via tags allocated in general and controlled hunts) to maintain those population numbers (see EIS Section 3.18.2 [Big Game Habitats and Populations]). Deer, elk, and pronghorn harvest statistics for 2020 (the latest year statistics are available for) in Units 52A and 53 are summarized in Table 3.12-2. There are more big game hunters and harvests in Unit 52A than in Unit 53. Harvest statistics for small game (including furbearer trapping) are not publicly available for the analysis area from IDFG.

Table 3.12-2. 2020 Harvest Statistics for Game Management Units 52A and 53

Hunt*	Unit 52A			Unit 53		
	Harvest (no.)	Hunters (no.)	Success (%)	Harvest (no.)	Hunters (no.)	Success (%)
Deer (general hunt)	189	1,099	17%	145	492	29%
Deer (controlled hunt) - muzzleloader	24	63	38%	–	–	–
Deer (controlled hunt) - archery	–	–	–	72	319	23%
Elk (general hunt)	134	512	26%	76	323	24%
Elk (controlled hunt)[†]	47	69	68%	–	–	–
Pronghorn (controlled hunt)[†]	35	47	74%	–	–	–

Source: IDFG (2020).

* Take method: All weapons except where specified.

[†] Harvest statistics are reported for Area 52-A1, which includes all of Units 52A and 68.

In the analysis area, there are 15,351 acres of established wildlife tracts. Of these 15,531 acres, approximately 744 acres occur in public lands in the siting corridors. The BLM and IDFG cooperatively manage the Wildlife Tracts program to provide permanent areas of wildlife habitat and public access for wildlife-related recreational pursuits, including hunting of upland game birds and other game species (IDFG 2021b). The BLM and cooperative partners implement specific management actions in these tracts to protect, maintain, and enhance wildlife habitat (primarily for upland game birds) and promote wildlife-related recreation.

3.12.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions that influence hunting and trapping opportunities in the analysis area include fire and fuels reduction treatments and habitat restoration projects, population and economic growth, electrical infrastructure development, linear transportation and motorized access, and renewable energy projects. Approximately 816,236 acres (35.5%) of the analysis area have been influenced by these existing and future trends and actions. Fuels reduction treatments and habitat restoration can often improve habitat quality for the benefit of big game species or other species targeted by hunters or trappers. Population growth and infrastructure development, particularly development of linear features (e.g., transmission lines and roads) and increases in human activity can disturb or displace wildlife species, reduce or alter their habitat, and increase mortality or injury due to vehicle strikes. This in turn can degrade opportunities for hunting and trapping. Linear features with permanent access roads increase the opportunity for motorized access to the hunting units; however, increased access is offset by increased wildlife disturbance and displacement as well as mortality from vehicle strikes associated with roads. Existing roads in the analysis area total approximately 6,630 linear miles (comprising 2,449 miles of paved and 4,182 miles of unpaved motorized roads). Other renewable energy projects that are proposed for future development in the analysis area (see EIS Section 3.1.1 [Existing and Future Trends and Actions]) would present a continued trend of increasing infrastructure and access road development resulting in similar impacts to hunting and trapping opportunities as previously discussed. Solar developments would have fencing surrounding the facilities that would restrict public access. For additional information on existing conditions for wildlife and habitat, including migratory pathways for big game species and wildlife habitat trends, see EIS Section 3.18.2 (Big Game Habitats and Populations).

3.12.1.2 Impacts

3.12.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and hunting and trapping access and opportunities would only be affected by existing and future trends and actions.

3.12.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

During the 2-year construction phase under Alternative B, public access to the siting corridors would be temporarily restricted as construction shifts across the analysis area. This would reduce hunting and trapping access temporarily in specific locations but not across the entirety of the siting corridors. Several measures would be taken during construction to control public access to the siting corridors and implement public safety measures (see Section 1.3.17 in MVE [2023]). As needed, alternative access routes to public lands in Units 52A and 53 outside the siting corridors would be identified by the BLM during construction. MVE’s applicant-committed measures 41 and 42 would be implemented during construction and would reduce the duration of public access restrictions to the extent practicable, while also ensuring public safety (see Table App4-2e in EIS Appendix 4).

A total of 38 miles of public roads and 4,619 acres of public lands in Unit 52A (0.5% of the total public lands open to hunting in the unit) and 363 miles of public roads and 74,015 acres in Unit 53 (17.5% of the total public land open to hunting in the unit) could have temporary restrictions during project construction (or approximately two fall hunting seasons) resulting in decreased hunting and trapping access and opportunities in those units. The BLM-permitted hunting outfitter would experience temporary restrictions within 4,619 acres in Unit 52A during the construction phase, but they would have full access to other available areas consistent with their outfitting permit. The area that the outfitter would be restricted from during construction represents less than 1% of the total area covered by the outfitter's permit. The amount of public lands and roads that would be potentially restricted to hunting and trapping uses during construction and operation is provided in Table 3.12-3 for each of the action alternatives.

Table 3.12-3. Public Land and Public Road Impacts during Construction and Operation by Action Alternative

Public Land and Road Impacts	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Public lands subject to access restrictions during construction (acres)	GMU 53: 74,015	GMU 53: 60,230	GMU 53: 45,387	GMU 53: 46,302	GMU 53: 40,815
	GMU 52A: 4,619	GMU 52A: 455	GMU 52A: 381	GMU 52A: 455	GMU 52A: 455
	Total: 78,634	*Total: 60,685*	*Total: 45,768*	*Total: 46,757*	*Total: 41,270*
Existing public roads potentially restricted to hunting during construction (miles)	GMU 53: 363	GMU 53: 304	GMU 53: 204	GMU 53: 250	GMU 53: 209
	GMU 52A: 38	GMU 52A: 23	GMU 52A: 22	GMU 52A: 23	GMU 52A: 23
	Total: 401	*Total: 327*	*Total: 226*	*Total: 273*	*Total: 232*
Public lands restricted to hunting during operation (acres)	GMU 53: 2,087	GMU 53: 1,674	GMU 53: 1,048	GMU 53: 1,283	GMU 53: 906
	GMU 52A: 130	GMU 52A: 13	GMU 52A: 9	GMU 52A: 13	GMU 52A: 10
	Total: 2,217	*Total: 1,687*	*Total: 1,057*	*Total: 1,296*	*Total: 916*
New public roads open to hunting during operation (miles)	GMU 53: 459	GMU 53: 360	GMU 53: 270	GMU 53: 272	GMU 53: 231
	GMU 52A: 27	GMU 52A: 0.1	GMU 52A: 0.1	GMU 52A: 0.1	GMU 52A: 0
	Total: 486	*Total: 360*	*Total: 270*	*Total: 272*	*Total: 231*
Improved public roads open to hunting during operation (miles)	GMU 53: 139	GMU 53: 117	GMU 53: 83	GMU 53: 101	GMU 53: 79
	GMU 52A: 8	GMU 52A: 0	GMU 52A: 0	GMU 52A: 0	GMU 52A: 0
	Total: 147	*Total: 117*	*Total: 83*	*Total: 101*	*Total: 79*

As discussed in Section 3.18.1 (Wildlife Movement [non-game mammals and reptiles]), EIS Section 3.18 (Big Game Habitats and Populations), and EIS Appendix 3 (AIB-2), increased noise and disturbance from human activity during construction would likely cause big game species and other small game, upland bird, or waterfowl species to avoid the siting corridors for the 2-year construction phase. Game or bird species displaced from the siting corridors may increase opportunity for hunting on surrounding public lands; however, a smaller area available for hunting could increase crowds and diminish the hunting experience for some users. MVE's applicant-committed measures to avoid development in sensitive habitat areas (measures 9, 11, 12, 14, and 17), minimize the potential for wildlife collisions or harassment (measures 15, 31, and 33), restrict certain activities during the nesting season (measures 139), minimize fences and use wildlife friendly fences (measures 43 and 44), and revegetate disturbed areas (measure 163) would minimize potential impacts to big game and other wildlife species of interest to hunters and trappers during construction. In addition, several mitigation measures required by BLM policy (E, J, N, P, Q, Y) would reduce potential impacts to big game and other wildlife species of interest to hunters and trappers through establishing speed limits to reduce wildlife collisions, prioritizing the placement of project facilities in previously disturbed areas, revegetating disturbed areas, and using wildlife-friendly fencing.

During the approximately 30-year operation phase, public lands in the siting corridors would be open to hunting and trapping access for the public and the permitted hunting outfitter, with the exception of fenced restricted areas (see Section 1.3.17 in MVE [2023]) such as the operation and maintenance facilities and substations. The operation footprint of proposed infrastructure (e.g., turbines, met towers, and substations) would reduce the amount of public lands available to hunting for the life of the project. Infrastructure areas on public lands that would no longer be open to hunting include 130 acres in Unit 52A (0.01% of the total public lands open to hunting in the unit) and 2,087 acres in Unit 53 (0.5% of the total public lands open to hunting in the unit). Additionally, occasional short-term and localized public access restrictions during operation and maintenance activities may limit hunting access to the siting corridors if the restrictions overlap the hunting season. The addition of 486 miles of new access roads and improvement of 147 miles of existing roads would also increase the opportunity for motorized and non-motorized access for hunting in the siting corridors. New roads created for the project would increase the mileage of existing roads in the siting corridors by 121%.

Although public lands would remain open to hunting, and access would be improved, biological effects to game species during operation would diminish hunting opportunities in the GMUs (see EIS Section 3.18.2 [Big Game Habitats and Populations] and EIS Appendix 3 [AIB-1 through AIB-5]). Increased human activity and motorized access during operation would disrupt big game species and likely cause big game to avoid the siting corridors. Avian species would also experience disturbance from construction noise and activity, leading to displacement or brood abandonment (see EIS Appendix 3 [AIB-2]). If individuals shift their use to areas outside of the siting corridors, hunting opportunities in the siting corridors would be reduced. Similar to the construction phase, having a smaller area available for hunting during operation could increase crowds and diminish the hunting experience for some users. Over time, big game and avian use of the siting corridors may improve as work areas are restored and big game and other wildlife species become acclimated to the infrastructure areas. However, increased ambient noise levels and visual changes to the landscape could diminish the hunting experience, resulting in some recreation users avoiding the area during the life of the project (estimated to be 34 years) in favor of other less developed areas. Overall, the effects of Alternative B on hunting access and opportunities would be higher in Unit 53 compared to Unit 52A because most of the siting corridors are within Unit 53. MVE would implement several applicant-committed measures during operation that would minimize potential impacts to big game and other wildlife species (1, 9, 11, 17, 19–24, 29, 30) by minimizing the footprint of operational disturbance, avoiding placement of infrastructure in sensitive habitat areas, inspecting and monitoring for wildlife impacts, minimizing the use of new roads during operation and maintenance, designing lighting systems to minimize wildlife impacts, and burying collector lines where practicable. In addition, several mitigation measures required by BLM policy (E, J, N, Y) would reduce potential impacts to big game and other wildlife species of interest to hunters and trappers through establishing speed limits to reduce wildlife collisions, prioritizing the placement of project facilities in previously disturbed areas, and using wildlife-friendly fencing.

Habitat loss and alteration from project development in wildlife tracts could affect the populations of upland game birds and other game species for which they are managed. Approximately 80.7 acres of ground disturbance in established wildlife tracts would occur, which represent 0.5% of all wildlife tracts in the analysis area. Of these 80.7 acres, 59.7 acres would be reclaimed following construction, and the remaining 21.0 acres would be occupied by access roads throughout project operation.

Hunting impacts during the approximately 2-year decommissioning phase would be similar to those described for construction because similar activities would occur. Decommissioning activities would temporarily restrict areas to hunting, and increased human activity would displace big game. Following decommissioning, public lands would be open to hunting in the siting corridors; however, big game would likely continue to avoid areas with ground disturbance until reclamation success is achieved in up to 50 years. Some operation-related facilities may be retained on public lands. If this occurs, those areas would not be reclaimed and would continue to preclude hunting uses. Human activity and motorized access along the access roads that are not decommissioned would continue to provide hunting access and disrupt big game.

Of all the action alternatives, Alternative B would have the largest siting corridor footprint and would therefore result in the greatest effects to hunting and trapping access and opportunities, in terms of both beneficial (e.g., improved access during operation) and adverse effects (e.g., reduced access during construction and decommissioning, reduced lands available to hunting during operation, public access restrictions during operation and maintenance, wildlife disturbance and displacement, and habitat loss and alteration).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for hunting and trapping access and opportunities are summarized in Table 3.12-4 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.12-4. Mitigation for Hunting and Trapping Access and Opportunities

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	E	
9	J	dd
11–12	N	hh
14–15	P	jj
17	Q	cccc–eeee
19–24	Y	–

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
29–31	–	–
33	–	–
43–44	–	–
139	–	–
163	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce the potential for biological effects to big game and other wildlife species that would diminish hunting opportunities in the analysis area during construction and operation.

3.12.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, the types of impacts to hunting and trapping access and opportunities would generally be the same as Alternative B, but the magnitude of impacts would be reduced due to the smaller siting corridors' footprint and the reduced potential for habitat fragmentation and wildlife avoidance, particularly north of ID 24. When compared to Alternative B, the amount of public lands and roads temporarily restricted to hunting during construction would be reduced by 17,949 acres and 74 miles, respectively, and the amount of public lands restricted to hunting during operation would be reduced by 530 acres (see Table 3.12-3). Potential effects to public access and hunting opportunities would be substantially reduced under this alternative for areas north of ID 24 (in GMU 52A) and in the western portion of siting corridors (in GMU 53) due to the removal of siting corridors from these areas. Potential biological effects to game species and other wildlife species during construction would be reduced due to fewer access roads and vehicle trips (see EIS Table 2.4-1 in EIS Section 2.4 [Alternative B (Proposed Action)]), resulting in a reduced potential for the diminishment of hunting opportunities. In addition, the reduced footprint of the siting corridors would result in a smaller, more concentrated area of disturbance, which big game animals would tend to avoid during construction and operation; therefore, the potential for wildlife to avoid the area and cause diminished hunting opportunities would be reduced compared to Alternative B. Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce the potential for biological effects to game species during construction and operation.

Operational access improvements would be reduced under this alternative due to 126 less miles of new roads and 30 less miles of improved roads compared to Alternative B. Alternative C would have 8 less acres of disturbance to wildlife tracks during construction and operation as compared to Alternative B. However, the potential biological effects to game species during operation would be reduced under Alternative C due to less habitat fragmentation north of ID 24 and fewer vehicle trips during operation (see EIS Table 2.4-1 in EIS Section 2.4 [Alternative B (Proposed Action)]), resulting in reduced potential for hunting opportunities to be diminished. Of all the action alternatives, the effects of Alternative C would be fewer than Alternative B but greater than Alternative D, Alternative E, and the Preferred Alternative.

3.12.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Under Alternative D, potential effects to hunting and trapping access and opportunities would generally be the same as Alternative C, except that the amount of public lands and roads temporarily restricted to hunting during construction would be reduced by an additional 14,917 acres and 101 miles, respectively, and the amount of public lands restricted to hunting during operation would be reduced by an additional

630 acres when compared to Alternative C (see Table 3.12-3). In addition, this alternative would provide fewer operational access improvements than Alternative C (90 less miles of new roads and 64 less miles of improved roads). Similar to Alternative C, potential effects to public access and hunting opportunities would be substantially reduced for areas north of ID 24 (in GMU 52A) and in the western portion of the project (in GMU 53). However, compared to Alternative C, this alternative further reduces potential effects in GMU 53 to hunting and trapping access and opportunities due to the removal of the siting corridors east of Crestview Road. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce the potential for biological effects to game species during construction and operation.

Alternative D would have 28 less acres of access road disturbance in wildlife tracts during construction and operation as compared to Alternative C and the potential biological effects to game species and diminishment of hunting opportunities would be even further reduced under Alternative D due to less habitat fragmentation east of Crestview Road, fewer access roads, fewer vehicle trips during construction and operation, and fewer construction and operation personnel (see EIS Table 2.4-1 in EIS Section 2.4 [Alternative B (Proposed Action]). Of all the action alternatives, the effects of Alternative D would be fewer than Alternatives B, C, and E but greater than the Preferred Alternative.

3.12.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Under Alternative E, potential effects to hunting and trapping access and opportunities would generally be the same as Alternative D, with only minor differences in the amount of public lands and roads that would be restricted to hunting during construction or operation, the mileage of operational access improvements, or the amount of human activity and disturbance during construction and operation (e.g., vehicle trips and personnel) (see Table 3.12-3 and EIS Table 2.4-1). Alternative E would have 22 greater acres of access road disturbance in wildlife tracts during construction and operation as Alternative D but less acres of disturbance than Alternatives B and C. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce the potential for biological effects to game species during construction and operation. The primary difference between Alternatives D and E is that Alternative E would retain siting corridors east of Crestview Road but would not include siting corridors in the southern portion of the project. Of the action alternatives, the effects of Alternative E would be fewer than Alternatives B and C but greater than Alternative D and the Preferred Alternative.

3.12.1.2.6 PREFERRED ALTERNATIVE

Under the Preferred Alternative, potential effects to hunting and trapping access and opportunities would be reduced relative to all other action alternatives due to the reduced footprint of the siting corridors. The potential effects of the Preferred Alternative are most similar to Alternative D. Compared to Alternative D, the amount of public lands temporarily restricted to hunting during construction would be reduced by an additional 4,498 acres, and the amount of public lands restricted to hunting during operation would be reduced by an additional 141 acres (see Table 3.12-3). The mileage of public roads temporarily restricted during construction and the mileage of new and improved public roads open to hunting during construction would be approximately the same as Alternative D.

Similar to Alternatives C, D, and E, potential effects to public access and hunting opportunities would be substantially reduced for areas north of ID 24 (in GMU 52A) and in the western portion of the siting corridors (in GMU 53). Similar to Alternative E, this alternative further reduces potential effects in the southern portion of the siting corridors. The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce the potential for biological effects to game species during construction and operation.

The Preferred Alternative would cause the least amount of disturbance (22.3 acres) in wildlife tracts during construction and operation compared to all other action alternatives. Since the Preferred Alternative has the smallest siting corridor footprint of all action alternatives, the potential biological effects to game species and diminishment of hunting opportunities would be even further reduced under the Preferred Alternative due to less habitat fragmentation, wildlife avoidance, and access restrictions. Although many of the impacts associated with access roads, vehicle trips, and personnel would not be meaningfully different from other action alternatives, the Preferred Alternative would still result in the least amount of adverse effects to hunting and trapping access and opportunities.

3.12.1.2.7 CUMULATIVE IMPACTS

The combined effects of the project and other future renewable energy development on adjacent lands could exacerbate impacts on wildlife species and thus to hunting and trapping opportunities in the local region. This would particularly be true in the event of overlapping construction periods or where the combined footprint of project infrastructure contributes to landscape level habitat fragmentation of wildlife habitat. If authorized by the BLM, the three proposed solar facilities' (described in EIS Section 3.1.1 [Existing and Future Trends and Actions]) perimeter fences combined could result in up to 10,300 acres excluded from public access.

3.12.1.3 Significance Determination

Under all action alternatives, there would not be significant impacts to hunting and trapping access and opportunities. There would be short-term restrictions on public access during the construction and decommissioning phases that would reduce hunting and trapping access. Additional short-term and long-term impacts to hunting and trapping would include noise and disturbance from human activity, biological effects to big game species, and habitat loss and alteration in wildlife tracts that would cause wildlife species avoidance of the siting corridors. Adverse effects on hunting and trapping would occur from wildlife species avoidance of the siting corridors during the life of the project. Reducing impacts to big game populations and compensating impacts to big game habitats (see EIS Section 3.18.2.4) would reduce the potential for hunting opportunities to be diminished in the analysis area.

3.12.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Irretrievable effects on hunting and trapping would occur from wildlife species avoidance of the siting corridors during the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives). These irretrievable effects would be reduced through compensatory mitigation for big game habitats and populations (see EIS Section 3.18.2.4) and are not expected to result in irreversible effects to hunting and trapping access and opportunities following decommissioning and successful final reclamation.

3.12.1.5 Compensatory Mitigation

Even with the implementation of applicant-committed measures and additional mitigation (see EIS Appendix 4), residual impacts to hunting and trapping opportunities could still occur due to biological impacts on big game species (refer to EIS Section 3.18.2.4 [Compensatory Mitigation for Big Game Habitats and Populations]).

3.12.2 Off-Highway Vehicle Opportunities and Experience

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.12-5.

Table 3.12-5. Analysis Approach for Off-Highway Vehicle Opportunities and Experience

Issue Analyzed in Detail	How would the project affect OHV opportunities and experiences?
Associated Issues Analyzed in Brief	Same as hunting and trapping access and opportunities (see Section 3.12.1)
Analysis Area	The SFO planning area because OHV routes are inventoried and managed at the field office level.
Indicators	Change in linear miles of OHV routes in the siting corridors and associated changes in recreational setting characteristics (RSC) (e.g., primitive vs. rural).
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	BLM GIS data for existing OHV routes in SFO planning area. BLM's Handbook H-8320-1, Planning for Recreation and Visitor Services (BLM 2014).
Assumptions	Same as hunting and trapping access and opportunities (see Section 3.12.1).

3.12.2.1 Affected Environment

Public lands in the siting corridors are used for OHV travel where OHV routes occur. OHV routes include roads or trails that are designated by the BLM as open or limited to OHV travel. OHV routes can vary widely in terms of their level of development and can range from paved roads to primitive dirt roads. The analysis area contains approximately 14,083 miles of existing OHV routes. Of these, approximately 563 linear miles (4.0%) of existing OHV routes occur in the siting corridors, and existing OHV routes are relatively uniformly distributed throughout the siting corridors. The BLM uses a system of RSCs to classify recreational opportunities based on their physical, social, and operational qualities and conditions such as remoteness, group size, and management controls (BLM 2014). As of the publication of this EIS, the SFO does not have a detailed travel management plan or OHV inventory where the RSCs of individual routes are identified. However, given the general landscape setting and character of the analysis area, it is reasonable to assume that the RSCs for existing OHV routes in the siting corridors range from primitive to rural, depending on proximity of OHV routes to existing roads, highways, agricultural land, or utility lines.

3.12.2.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions that have influenced OHV opportunities in the analysis area include electrical infrastructure development, linear transportation, and motorized access. Development projects, particularly development of linear features with permanent access roads, have increased OHV opportunities by adding public roads to the analysis area that are open to OHV use. However, these developments have also resulted in changes to the landscape setting of affected areas, which in turn has influenced the RSC of existing OHV routes in those same areas; as more infrastructure development occurs in the analysis area, the RSC of affected OHV routes will shift from a more primitive and remote setting to a more developed and modified landscape. If authorized by the BLM, the three proposed solar facilities in the area would have fencing surrounding the facilities that would exclude public access to 10,300 acres.

3.12.2.2 Impacts

3.12.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and OHV opportunities and experiences would only be affected by existing and future trends and actions.

3.12.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

During the approximately 2-year construction phase under Alternative B, public access to the siting corridors would be subject to temporary restrictions as construction shifts across the analysis area, thereby reducing OHV opportunities in the siting corridors. This would result in 601 miles of OHV routes being potentially restricted during construction (or 4.3% of existing OHV routes in the analysis area). During construction, increased noise, dust, human activity, and traffic would also alter the character of the area for OHV users, making the trails feel less remote and potentially causing people to avoid recreating in the immediate area.

During the approximately 30-year operation phase, public lands and existing OHV routes in the siting corridors would remain open to the public, and public use of new and improved access roads (including OHV use) would also be allowed. The addition of 486 miles of new access roads and improvement of 147 miles of existing roads, which would be open to OHV users, would create new OHV access and opportunities in the siting corridors. Estimated changes in the mileage of open OHV routes and access roads during construction and operation are summarized in Table 3.12-6 for each of the action alternatives.

Table 3.12-6. Off-Highway Vehicle Access and Opportunities During Construction and Operation by Action Alternative

Change in OHV Routes	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
OHV routes potentially restricted during construction (miles)	601	465	348	390	330
New access roads available for OHV use during operation (miles)	486	360	270	272	231
Improved access roads available for OHV use during operation (miles)	147	117	83	101	79

During project operation, the mileage of existing OHV routes would remain unchanged from existing conditions. However, the RSC of existing OHV routes in the siting corridors would be modified and would shift from a more primitive and remote setting to a more developed and modified landscape; therefore, OHV users who prefer primitive routes may decide to recreate elsewhere. Additionally, occasional short-term and localized public access restrictions during operation and maintenance activities may limit OHV access to the siting corridors, resulting in reduced OHV opportunities. Once project operation is complete, all access roads would remain left in place for continued use by OHV and other recreational users.

The following applicant-committed measures would be implemented to reduce potential impacts to OHV opportunities and experience: 18–20, 29, 31, 36, 39, 41, 42, and 113–119 (see Table App4-2 in EIS Appendix 4). MVE’s applicant-committed measures 41 and 42 would reduce the duration of public access restrictions to the extent practicable, while also ensuring public safety, whereas the remaining measures listed would reduce the potential for increased dust (113–119), traffic (31, 36, and 39), or visual impacts (18-20 and 29) to alter the character of the area for OHV users. In addition, several mitigation measures required by BLM policy (D, E, F, H, and J) would reduce potential impacts to the character of the area for OHV users by minimizing visual impacts and encouraging the co-location of infrastructure within previously disturbed areas. Of all the action alternatives, Alternative B has the largest siting corridor footprint and would therefore result in the greatest effects to OHV opportunities and experiences in terms of both beneficial (e.g., improved access during operation) and adverse effects (e.g., reduced access during construction, RSC modifications, and public access restrictions during operation and maintenance).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for off-highway vehicle opportunities and experience are summarized in Table 3.12-7 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.12-7. Mitigation for Off-Highway Vehicle Opportunities and Experience

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	D	e
9	E	g–j
11–12	F	ggg
14–15	H	rrr–sss
18–20	J	–
29	–	–
31	–	–
36	–	–
39	–	–
41–42	–	–
113–119	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of these additional measures would further reduce or avoid impacts to the character of the area for OHV users by reducing the potential for increased dust and visual impacts during construction and operation.

3.12.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Under Alternative C, the types of impacts to OHV opportunities and experiences would be the same as Alternative B, but the magnitude of impacts would be reduced because of the siting corridors' smaller footprint. Compared to Alternative B, 136 less miles of existing OHV routes would be temporarily restricted to the public during construction, and 126 less miles of new access roads and 30 less miles of improved access roads would be created for public use during operation (see Table 3.12-6). These reduced effects to OHV opportunities and experiences would occur in the western portion of the siting corridors and north of ID 24. Of all the action alternatives, the effects of Alternative C on OHV opportunities and experiences would be fewer than Alternative B but greater than Alternatives D and E.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to OHV opportunities and experiences.

3.12.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Under Alternative D, impacts to OHV opportunities and experiences would be the same as Alternative C, except that effects on OHV opportunities and experiences in areas east of Crestview Road would also be reduced. Compared to Alternative C, this alternative would result in less miles of existing OHV routes being temporarily restricted to the public during construction and less miles of new and improved access roads being created for public use during operation (see Table 3.12-6). Of all the action alternatives, Alternative D would result in the second-fewest effects to OHV opportunities and experiences.

Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to OHV opportunities and experiences.

3.12.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Under Alternative E, impacts to OHV opportunities and experiences would generally be the same as Alternative C except that effects on OHV opportunities and experiences in the southern portion of the siting corridors would be reduced instead of in the areas east of Crestview Road. Compared to Alternative C, this alternative would result in less miles of existing OHV routes being temporarily restricted to the public during construction and less miles of new and improved access roads being created for public use during operation (see Table 3.12-6). The effects of Alternative E on OHV opportunities and experiences would be fewer than Alternatives B and C but greater than Alternative E and the Preferred Alternative.

Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to OHV opportunities and experiences.

3.12.2.2.6 PREFERRED ALTERNATIVE

Under the Preferred Alternative, impacts to OHV opportunities and experiences would generally be the same as Alternative E but with even less miles of existing OHV routes being temporarily restricted to the public during construction and less miles of new and improved access roads being created for public use during operation (see Table 3.12-6). Of all the action alternatives, the Preferred Alternative would result in the fewest effects to OHV opportunities and experiences.

The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to OHV opportunities and experiences.

3.12.2.2.7 CUMULATIVE IMPACTS

The combined effects of the action alternatives and other future renewable energy development on adjacent lands on OHV access and opportunities would be compounded, particularly in the event of overlapping construction periods or where the combined footprint of project infrastructure results in cumulative effects to landscape setting and RSC classifications. The cumulative effects to OHV access and opportunities would be greatest under Alternative B because this alternative would impact the greatest mileage of roads. If authorized by the BLM, the three proposed solar facilities' (described in EIS Section 3.1.1 [Existing and Future Trends and Actions]) perimeter fences combined could result in up to 10,300 acres excluded from public access.

3.12.2.3 Significance Determination

Under all action alternatives, potential adverse effects to OHV access and opportunities would not be significant. Short-term effects would include temporary restrictions on OHV access during the construction and decommissioning phases. The creation of new OHV access and opportunities in the siting corridors would have beneficial effects over the long term.

3.12.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

No irretrievable or irreversible effects to OHV access and opportunities would occur under all action alternatives.

3.13 SOILS

3.13.1 Soil and Plant Growth Materials

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.13-1.

Table 3.13-1. Analysis Approach for Soil and Plant Growth Materials

Issue Analyzed in Detail	How would the project impact sensitive soils, soil health, and plant growth material quantity and quality?
Associated Issues Analyzed in Brief	AIB-30: Are earthquakes of concern in the vicinity of the project, and if not, why? AIB-31: Is the surface geology in the siting corridors suitable for the proposed project infrastructure? Is collapse/subsidence a concern, and if not, why? AIB-32: How would vibrations from project wind turbines affect nearby structures? AIB-33: How would the project affect hydric soils in the siting corridors and how many acres would be affected? AIB-34: How would the project affect prime and unique farmland or productive soils in the vicinity of the project and how many acres would be affected? AIB-35: How would project activities impact wind and water erosion and deposition? AIB-36: Could project construction increase the potential for landslides in the project vicinity?
Analysis Area	The siting corridors.
Indicators	Acres of ground disturbance. Acres of ground disturbance in areas with very fragile soils that may have limited reclamation potential. Estimated volume of salvaged topsoil and lost topsoil.
Impacts Duration	The impacts duration for ground disturbance (work areas and infrastructure areas) would be the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus an estimated 5 years following reclamation for grasses to reestablish. Impacts due to soil horizon mixing could potentially be permanent. Interim reclamation between the end of construction and the start of decommissioning would occur in work areas; no interim reclamation would occur in infrastructure areas. Some areas with biological soil crusts may have impacts that last up to 125 years (BLM 2001). This EIS assumes very fragile soils would have limited reclamation potential, and impacts would be permanent (defined as irreversible in EIS Section 3.1.2.4 [Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity]). In areas where concrete foundations deeper than 3 feet below surrounding grade would remain in place, soils may be affected permanently.
Data Sources	Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database soils data (NRCS 2020a). NRCS ecological site descriptions (NRCS 2020b). BLM AIM data (BLM 2022a).

3.13.1.1 Affected Environment

The analysis area is in the Snake River Plains Major Land Resource Area (MLRA) 11 (NRCS 2006). This MLRA is characterized by relatively flat sheets of basalt formed by the Columbia River basalt flows that form large, flat plains. The dominant soil order in MRLA 11 is Aridisols, and these soils were largely formed from basalts, cinders, and wind-blown materials. The soils are silty, loamy, or clayey; range from shallow to very deep; and are generally well drained. The dominant soil units in MRLA 11 are Power-McCain complex, 1% to 6% slopes; Power-Owinza-Rock outcrop complex, 1% to 8% slopes; and the Paulville-McPan-Starbuck complex, 1% to 8% slopes. A list of soil units in the analysis area is provided in Table 3.13-2. Approximately 79,991 acres of soils in the analysis area (95%) are classified as “fragile” and 3,814 acres (4.5% of the analysis area) are classified as “very fragile” (Figure 3.13-1) (NRCS 2020a). Very fragile soils may have a limited reclamation potential because they are highly susceptible to erosion and have a low capability to recover after disturbance (NRCS 2020a, 2022). Very fragile soils are often found on sloping ground with sparse plant cover and are characterized by having low organic matter content, low stability, and a weak soil structure.

Other sensitive soil types that may exist in the analysis area include biological soil crusts and areas with native seed banks. There is a lack of data regarding the prevalence and extent of biological soil crusts and areas with native seed banks in the analysis area, but they are expected to be present based on cursory observations and the presence of sagebrush steppe ecosystem type (BLM 2001). Biological soil crusts and their unique microbial communities, including cyanobacteria, lichens, and moss, exist in arid and semiarid lands across the West, often where vegetation cover is sparse or absent. Biological soils crusts help retain soil moisture, discourage weed growth, reduce soil erosion and runoff, and provide other important functions in the ecosystem. The extent of biological soil crusts and native seed banks in the analysis area is not known; therefore, the analysis assumes they would be present throughout the portion of the analysis area estimated to have native upland vegetation (50,843 acres). Recovery rates for disturbed biological soil crusts can range from 2 to 3,000 years depending on the duration and severity of the disturbance and climatic conditions; recovery in the analysis area is expected to take approximately 125 years (BLM 2001). Native seed banks exist in most soil types, including those in the analysis area, though they are not always reflective of the species aboveground; often the density and diversity of seeds in a seed bank are greater than that of the species aboveground (Shiferaw et al. 2018).

Table 3.13-2. Soil Survey Geographic Database Soil Types in the Analysis Area

Soil Map Unit Name	Fragile Soil Index Rating	Acres (% of analysis area)
Power-McCain complex, 1% to 6% slopes	Fragile	18,489 (22%)
Power-Owinza-Rock outcrop complex, 1% to 8% slopes	Fragile	12,201 (14%)
Rock outcrop-Banbury-Paulville complex, 2% to 6% slopes	Fragile	8,048 (10%)
Paulville-McPan-Starbuck complex, 1% to 8% slopes	Fragile	8,591 (10%)
Sidlake-Starbuck complex, 1% to 8% slopes	Fragile	4,426 (5%)
Paulville-McPan complex, 1% to 6% slopes	Fragile	3,951 (5%)
Catchell-Paulville complex, 2% to 10% slopes	Fragile	3,548 (4%)
Power-McPan complex, 1% to 3% slopes	Fragile	2,254 (3%)
Starbuck-Sidlake-Rock outcrop complex, 2% to 15% slopes	Fragile	1,721 (2%)
Hoosegow-McPan-Rock outcrop complex, 2% to 10% slopes	Fragile	1,651 (2%)
Chuska gravelly loam, 2% to 12% slopes	Fragile	1,429 (2%)
Hoosegow-Sidlake-Rock outcrop complex, 2% to 15% slopes	Fragile	1,227 (1%)
Power-Starbuck-Rock outcrop complex, 0% to 6% slopes	Fragile	1,213 (1%)
Barrymore-Starbuck complex, 1% to 4% slopes	Very fragile	1,136 (1%)
Vining-Kecko-Rock outcrop complex, 2% to 12% slopes	Fragile	1,108 (1%)
Starbuck-Rock outcrop-McPan complex, 2% to 6% slopes	Fragile	1,013 (1%)
Total fragile soils (including soil map units that are less than 1,000 acres)	Fragile	**79,991 (95%)**
Total very fragile soils (including soil map units that are less than 1,000 acres)	Very fragile	**3,814 (4.5%)**
Total moderately fragile soils (including soil map units that are less than 1,000 acres)	Moderately fragile	**96 (< 1%)**
Total not rated soils (including soil map units that are less than 1,000 acres)	Not rated	**150 (< 1%)**

Source: NRCS (2020a).

Note: Only soil map units that make up more than 1,000 acres of the analysis area are listed individually in the table.

The NRCS ecological sites in the analysis area are generally representative of loamy sites. Ecological sites are delineations of areas that share similar physical and biological characteristics, including soil attributes, estimated topsoil depths, and vegetation assemblages (NRCS 2020b). The full list of ecological sites in the analysis area is provided in Table 3.13-3.

Table 3.13-3. Natural Resources Conservation Service Ecological Sites and Topsoil Depths in the Analysis Area

Ecological Site	Estimated Topsoil Depths (inches)	Acres (% of analysis area)
LOAMY 8-12 – Provisional	2–7	34,795 (41%)
LOAMY 8-12 ARTRT/PSSPS	4–6	22,947 (27%)
No mapped ecological site	Not applicable	15,384 (18%)
CLAYPAN 8-12 ARTRW8/PSSPS	4–6	3,547 (4%)
LOAMY BOTTOM 8-14 ARTRT/LECI4	2–10	3,015 (4%)
SHALLOW LOAMY 8-12 ARTRT/PSSPS	1–4	2,747 (3%)
PLAYA 8-12 ARTR4/PSSPS	3–8	605 (1%)
SHALLOW LOAMY 8-12 – Provisional	1–8	376 (< 1%)
SANDY 8-14 ARTRT/HECOC8-ACHY	1–9	323 (< 1%)

Source: NRCS (2020b).

Figure 3.13-1. Soil map units in the analysis area.

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3.13.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and would continue to influence soils in the analysis area in various ways. Surface disturbance associated with past and planned transportation, energy development, or irrigation (agriculture) has incrementally contributed to soil disturbance through increased impervious surfaces; earth-moving activities, which disrupt the underlying horizons; erosion; and compaction. Additionally, several wildfires have occurred in and adjacent to the analysis area between 1980 and 2022 (the period for which data are available; BLM [2022b]), which, combined with reseeding and livestock grazing, have resulted in alterations to natural vegetation with the introduction of nonnative vegetation and annual grasses (BLM 2019). Fire can cause long-term changes in the species composition of native seed banks and lead to an increase in the prevalence of nonnative species in the seed bank (Hosna et al. 2022), especially when fires are high intensity (Shi et al. 2022). Soil stability can also decrease in areas where wildfires and livestock grazing have occurred; however, as described in Section 3.7.1.1.5 (Fires and Fuels Management, Existing and Future Trends and Actions), approximately 74% of the siting corridors have been reseeded, which reduces the potential for soil erosion in those areas. These existing and future trends and actions have affected or would affect 77,628 acres (92%) of the 84,051-acre analysis area.

3.13.1.2 Impacts

3.13.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and soil and plant growth material would only be affected by existing and future trends and actions.

3.13.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

Alternative B would have a total of 9,114 acres of ground disturbance. Approximately 6,740 of those acres would receive interim reclamation before project decommissioning (i.e., work areas) (Table 3.13-4), though these areas may be re-disturbed at any time for project maintenance. Interim reclamation would revegetate areas to a state as close to pre-project conditions as possible (except in very fragile soils as described below), as defined in MVE’s reclamation plan and with success criteria approved by the BLM. Soil impacts in work areas due to compaction, loss of vegetation, and seedbank disturbance would be present for approximately 5 years following reclamation, though impacts from topsoil and soil horizon mixing may potentially be permanent. Approximately 2,374 acres would be disturbed by project infrastructure for the duration of the project through decommissioning, up to 34 years plus approximately 5 years following reclamation for grasses to reestablish. Topsoil would be lost and soil horizons would be mixed for all infrastructure areas; this mixing may be permanent. Approximately 413 acres of ground disturbance would occur in very fragile soils, where reclamation potential would be limited because of limiting revegetation factors and thus impacts would be permanent. However, one of the indicators of very fragile soils is steep slopes, on which ground disturbance would be minimized (applicant-committed measures 129 and 131). Thus, actual ground disturbance on very fragile soils may likely be less than that estimated in this EIS.

Although portions of the analysis area have been highly modified from wildfires and the spread of invasive, annual grasses, the underlying soil conditions are generally productive for vegetation growth. The BLM has established 12 AIM plots in and near (within 1 mile of) the analysis area to monitor vegetation communities and soil stability; total foliar cover for these 12 plots ranges from 65.3% to 98.7%, and soil stability ranges from 2.9 to 6.0 (on a scale of 0 [least stable] to 6 [most stable]) (BLM

2022a) with a median value of 5.2. Vegetation is described in detail in Section 3.15.1 (Native Upland Vegetation Communities).

Additionally, there would be approximately 550 acres of concrete foundations, which may leech minerals into the surrounding soil and potentially affect soil pH. Though reclamation would remove concrete foundations to a minimum of 3 feet below surrounding grade (applicant-committed measure 162), foundations deeper than that could remain and affect soils permanently.

Table 3.13-4. Summary of Impacts to Soils in the Analysis Area

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of ground disturbance (% of analysis area)	9,114 (11%) total 6,740 (8%) work area 2,374 (3%) infrastructure	6,953 (11%) total 5,142 (8%) work area 1,811 (3%) infrastructure	4,838 (10%) total 3,714 (8%) work area 1,124 (2%) infrastructure	5,136 (10%) total 3,734 (7%) work area 1,402 (3%) infrastructure	4,492 (10%) total 3,500 (8%) work area 992 (2%) infrastructure
Acres of ground disturbance in very fragile soils (% of very fragile soils in analysis area)	413 (11%)	312 (8%)	257 (7%)	236 (6%)	145 (4%)
Work area topsoil salvage (cubic yards)*	4,310,832	4,143,951	3,017,980	2,885,981	2,762,892
Infrastructure topsoil salvage (cubic yards)*	1,517,899	1,398,584	1,097,447	1,063,256	759,206

* Salvaged topsoil may be used in the salvage location or other locations in the siting corridors.

BLM (2005) states that the impacts to soil by erosion from wind energy facilities would be minimal to negligible because BMPs would be followed to prevent or address potential increases in soil erosion (2005:6–3). MVE's applicant-committed measures to minimize work areas and infrastructure areas (measure 1) and control erosion (measures 120 to 135) would minimize ground disturbance and erosion of soils. Interim and final reclamation monitoring would be conducted by MVE until the success criteria is met or up to 5 years following the initial reclamation activities (applicant-committed measure 163). If desired cover and diversity thresholds (see Appendix E of MVE [2023] for details) have not been met after 5 years, MVE would coordinate with the BLM on possible adjustments to the criteria or the use of adaptive management procedures to address revegetation challenges. However, BLM policy requires desired plant communities to be restored in all disturbed areas (required mitigation measure P). Reclamation success is defined by the re-establishment of vegetation and topography compared to conditions in the surrounding area at the time of reclamation. Interim reclamation would be irrigated if necessary for establishing seedlings more quickly. Mulching techniques would be used to expedite reclamation and to protect soils (required mitigation measure Q). These plans and measures would help reduce but not eliminate the potential impacts on soils.

Before ground disturbance, the topsoil would be stripped and salvaged to the extent practicable to minimize soil mixing topsoil with subsoil (applicant-committed measure 161). Topsoil depths vary in the siting corridors based on site conditions; the estimated volume of topsoil that would be salvaged is summarized in Table 3.13-4. Within the 6,740 acres of work areas, salvaged topsoil (estimated 4,310,832 cubic yards) would be spread back onto the disturbed areas during interim reclamation. For the 2,374 acres of infrastructure, the salvaged topsoil (estimated 1,517,899 cubic yards) cannot be effectively stored for the life of the project and therefore would be used during interim reclamation of work areas. Even with the most detailed topsoil salvaging, some topsoil mixing and loss would be expected within both work areas and infrastructure areas. Though the amount of topsoil mixing and loss cannot accurately be estimated, topsoil within work areas would be disturbed again during decommissioning. Estimates of how long it takes to form new topsoil vary, but it is known to take at least 100 years and up to 1,000 years depending on the geologic and climatic conditions present (NRCS 2021). Topsoil formation in arid climates similar to those in the analysis area tends to take longer due to the relative cold temperatures and lack of moisture (NRCS 2021).

Topsoil would be replaced from the area it was excavated from to avoid introducing nonnative species to new areas (applicant-committed measure 161). Topsoil would be used in the vicinity of where it was excavated to meet grading needs. In work areas, topsoil bearing organic components would be windrowed at the edge of work areas for use during reclamation. If additional topsoil is needed, locally sourced topsoil would be preferred. If imported topsoil is needed, MVE would use a BLM-approved source. In areas where topsoil cannot be replaced from on-site, seedbank disturbance would be permanent.

Project impacts to biological soil crusts and native seed banks, including burial, compaction, and mortality of soil crusts; loss of seed bank; and the introduction of nonnative seed banks would last longer than impacts to other soil resources because of the longer recovery periods. Mechanical disturbance (from vehicles) and burial of biological soil crusts reduce lichen and moss cover and biological soil crust species diversity (BLM 2001). Recovery times for biological soil crusts in the analysis area (and the greater Northern Great Plains) are estimated to be up to 125 years for full recovery (BLM 2001). Native seed banks can survive varying disturbances on the landscape and can contain adequate plant diversity to recover from disturbances; although in areas dominated by invasive annual species, this can be more difficult (Barga and Leger 2018). The extent of biological soil crusts and native seed banks in the analysis area is not known; therefore, the analysis assumes they would be present throughout the portion of the analysis area estimated to have native upland vegetation, of which 1,424 acres would be affected by ground disturbance.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for soil and plant growth materials are summarized in Table 3.13-5 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.13-5. Mitigation for Soil and Plant Growth Materials

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	P	a
100	Q	ggg–hhh
120–135	–	mmmm
161–163	–	–

Note: All measures are detailed in EIS Appendix 4.

Implementation of these additional mitigation measures under Alternative B would further reduce or avoid impacts to soils and plant growth materials by reducing the potential disturbance to soils classified as prime or unique farmland, biological soil crusts, and wet soils and by extending all applicant-committed measures to apply to the operation and decommissioning phases.

3.13.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would have similar impacts on soils as Alternative B; however, the reduction of the western and northern siting corridors under Alternative C would reduce impacts to soils. Alternative C would reduce ground disturbance within very fragile soils by 101 acres (or 24%) in comparison to Alternative B (see Table 3.13-4). The decreased footprint would also result in less volume of topsoil salvage as compared to Alternative B. Impacts from concrete foundations (536 acres) would be reduced by 14 acres in comparison to Alternative B. Overall, Alternative C would have fewer impacts to sensitive soils, soil health, and plant growth material quantity and quality due to less acres of ground disturbance.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to soils and plant growth material.

3.13.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would have similar impacts on soils as Alternative B; however, the reduced western, eastern, and northern footprints of the siting corridors for Alternative D would reduce impacts to soils. Acres of ground disturbance would be the second fewest of the action alternatives. Alternative D would reduce ground disturbance in very fragile soils by 156 acres (or 38%) in comparison to Alternative B (see Table 3.13-4), which is less disturbance than Alternatives B and C but more than Alternative E and the Preferred Alternative. It would also result in less volume of topsoil salvage as compared to Alternatives B and C but more than Alternative E and the Preferred Alternative. Impacts from concrete foundations (441 acres) would be reduced by 109 acres in comparison to Alternative B. Overall, under Alternative D, impacts to sensitive soils, soil health, and plant growth material quantity and quality would be greatly reduced in comparison to Alternatives B and C but would be slightly greater in comparison to Alternative E and the Preferred Alternative.

Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to soils and plant growth material.

3.13.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would have similar impacts on soils as Alternative B; however, the decreased southern, western, and northern footprints of the siting corridors under Alternative E would reduce impacts to soils. Acres of ground disturbance would be much fewer than Alternatives B and C but slightly greater than Alternative D and the Preferred Alternative. Due to the smaller footprint, Alternative E would reduce ground disturbance in very fragile soils by 177 acres (or 43%) in comparison to Alternative B (see Table 3.13-4), only the Preferred Alternative would result in less ground disturbance in very fragile soils. Alternative E would also result in the second least volume of topsoil salvage of the action alternatives. Impacts from concrete foundations (424 acres) would be reduced by 126 acres in comparison to Alternative B. Overall, Alternative E would have the second fewest impacts to sensitive soils, soil health, and plant growth material quantity and quality.

Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to soils and plant growth material.

3.13.1.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would have similar impacts on soils as Alternative B; however, the decreased southern, western, and northern footprints of the siting corridors under the Preferred Alternative would reduce impacts to soils. Acres of ground disturbance would be the fewest of the action alternatives. Because of the smaller footprint, the Preferred Alternative would reduce ground disturbance in very fragile soils by 268 acres (or 65%) in comparison to Alternative B (see Table 3.13-4). The Preferred Alternative would also result in the least volume of topsoil salvage of the action alternatives. Impacts from concrete foundations (371 acres) would be reduced by 179 acres in comparison to Alternative B. Overall, the Preferred Alternative would have the fewest impacts to sensitive soils, soil health, and plant growth material quantity and quality.

The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to soils and plant growth material.

3.13.1.2.7 CUMULATIVE IMPACTS

As described in Section 3.13.1.1 (Affected Environment) above, approximately 92% of the analysis area has been impacted by human development, grazing, and the invasion of nonnative plants; therefore, the existing soil structure, sensitive soils, and native seed banks may no longer be intact (Hosna et al. 2022; Kinucan and Smeins 1992; Lai and Kumar 2020; Pol et al. 2014; Shi et al. 2022). Alternative B would disturb 11% of the analysis area (some of which may overlap with areas already disturbed), which would further degrade the remaining intact soils, sensitive soils, and native seed banks in the analysis area. Overall, this would leave relatively little intact soils in the analysis area. Alternative B would have the largest contribution to soil degradation and loss of sensitive soils of the action alternatives because it would have the largest area of ground disturbance. Alternatives C through E and the Preferred Alternative would each disturb less of the analysis area than Alternative B (8%, 6%, 6%, and 5%, respectively), and therefore, would have a smaller contribution to cumulative impacts on soils.

3.13.1.3 Significance Determination

Under all action alternatives, potential adverse effects to soil and plant growth materials would not be significant. Soil compaction, topsoil loss and soil horizon mixing, loss of vegetation, and seedbank disturbance from work area and infrastructure disturbance would have adverse effects on soils and plant growth materials that could last up to 41 years, i.e., the life of the project through reclamation. These impacts would not be significant because soil health and seedbanks would be restored during interim and final reclamation (Appendix E of MVE [2023]) to success criteria defined by BLM.

3.13.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, soil compaction, topsoil loss and soil horizon mixing, loss of vegetation, and seedbank disturbance from work area and infrastructure disturbance would have irretrievable effects on soils and plant growth materials that could last up to 41 years, i.e., the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus up to 5 years for final reclamation. These impacts would not be irreversible because soil health and seedbanks would be restored during interim and final reclamation. Irreversible impacts to soil health and plant growth materials would occur from ground disturbance in very fragile soils due to the limited potential for successful reclamation in these soils. Additionally, there would be irreversible soil impacts where concrete footings and foundations that may leech minerals into the surrounding soils are left in place or where the BLM may choose to leave roads in place, and thus, impacts to soils would be permanent. Altogether, this would irreversibly impact up to 1,964 acres under Alternative B and up to 1,115 acres under the Preferred Alternative. Impacts to biological soil crusts would also be considered irreversible because they may take 125 years to recover (BLM 2001). Because of the small scale of these adverse effects, they would not be significant.

3.14 TRANSPORTATION

3.14.1 Traffic Patterns

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.14-1.

Table 3.14-1. Analysis Approach for Traffic Patterns

Issue Analyzed in Detail	How would traffic associated with the project affect existing traffic patterns on major public roads?
Associated Issues Analyzed in Brief	AIB-37: How would the project's operation traffic impact the condition and maintenance of major public roads? AIB-38: How would the weight/load characteristics of project truck traffic impact the existing major public roads? AIB-39: How would project road use on BLM lands affect maintenance of the roads, including winter maintenance? AIB-40: How would construction equipment or material delivery via the Union Pacific Railroad (UPRR) rail lines impact rail traffic and rail conditions? See also EIS Section 3.18.2 (Big Game Habitats and Populations) and Sections 3.18 (Wildlife) and 3.12 (Recreation) for an evaluation of the potential impacts from new and improved access near the project.
Analysis Area	The primary public roads and intersections that would be used to access the siting corridors, including I-84, U.S. 93, ID 24, ID 25, and local county roads (Figure 3.14-1).
Indicators	Number of vehicle trips generated during project construction, operation, and decommissioning. Changes to annual average daily traffic (AADT) on major public roads during project construction, operation, and decommissioning. Changes to LOS for major public roads during project construction, operation, and decommissioning.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and reclamation.
Data Sources	Appendix K (Flagging, Fencing, and Signage Plan) and Appendix J (Road Design, Traffic, and Transportation Plan) of MVE (2023). AADT for major roads. MVE's Transportation Assessment for the Lava Ridge Wind Project (Mott MacDonald 2021a). MVE's Review of -Trip Generation and Delivery Flow Plan – November 2021 Updates (Mott MacDonald 2021b). MVE's trip generation report for the project (RRC 2022).
Assumptions	Since specific turbine component delivery routes are unknown (and would not be determined until closer to the start of construction) and would be determined by the turbine manufacturer, it is assumed that delivery of equipment and materials would enter the analysis area by I-84 or by private rail. Although any public road may be used during construction and operation, the primary routes identified in Mott MacDonald (2021a) and RRC (2022) represent reasonable and conservative estimates of traffic use for the project based on consideration of roadway limitations (e.g., size, weight, and seasonal restrictions). These are the routes used in the EIS analysis. The same primary haul routes identified in Mott MacDonald (2021a) and RRC (2022) would be used under all the action alternatives. Construction and decommissioning traffic from workers commuting to the siting corridors would originate in the local communities (e.g., Shoshone, Jerome, Twin Falls) or the Boise metropolitan area. MVE or its contractors and suppliers would be responsible for permitting oversized loads associated with the project, including turbine component delivery. Trip estimates for construction, operation, and decommissioning are provided in EIS Chapter 2, EIS Tables 2.4-1 and 2.4-3. Although the trip estimates in RRC (2022) differ slightly from those in EIS Tables 2.4-1 and 2.4-3, they are reasonable estimates that reflect construction and operation activities and workforce numbers over the life of the project. Roadway capacity LOS ratings in Mott MacDonald (2021a) are conservative estimates that reflect peak construction activity and workforce numbers. Water truck trips were not included in the trip estimates from RCC (2022) as it is assumed that the on-site wells would be used as water sources, and thus distance travelled from them would be small.

	The number of vehicle trips associated with decommissioning would be similar to those required during project construction and would not substantially deviate from RRC (2022). The BLM does not have the authority to approve or deny the use of the public roads managed by the ITD and the local highway districts for the project. MVE would be responsible for obtaining required approvals from ITD or the local highway districts and would comply with the terms and conditions of those approvals.

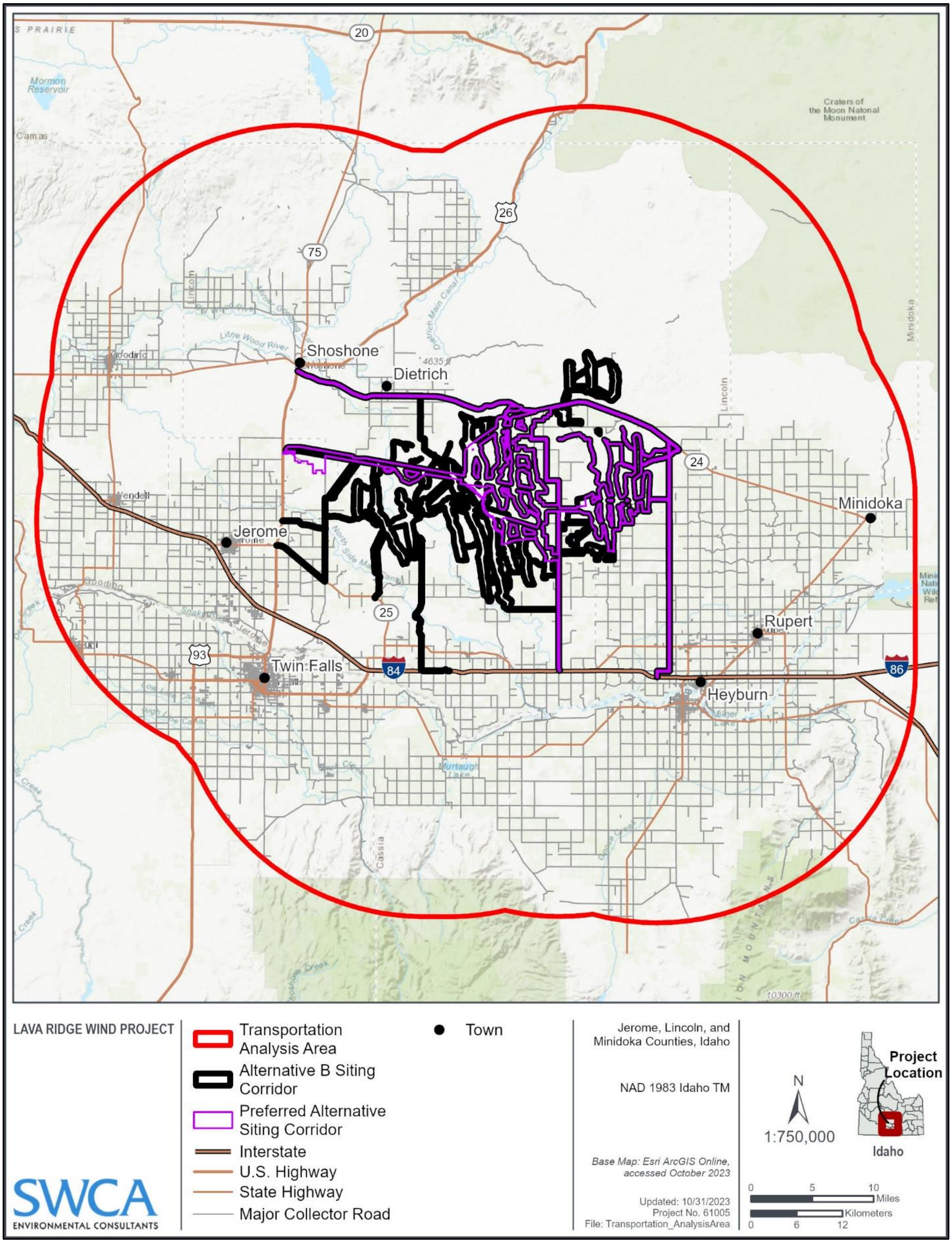

Figure 3.14-1. Transportation analysis area.

3.14.1.1 Affected Environment

Existing transportation infrastructure resources and conditions in the analysis area are discussed here. The primary haul routes, intersections, and proposed access roads in and near the siting corridors are shown in Figure 3.14-2.

3.14.1.1.1 ROADWAYS

Table 3.14-2 summarizes the major roadways in the analysis area. These roadways are those with ITD traffic counts and would either be used for the project as primary transportation haul routes or for secondary access to the siting corridors. Other small paved and unpaved public and private roads are also near the siting corridors. The primary routes shown in Figure 3.14-2 include major highways and arterial roadways that would be used to access the siting corridors from the surrounding regions; alternate primary routes (also shown in Figure 3.14-2) may be used for turbine delivery if primary routes become overly congested or inaccessible. Proposed access roads in the siting corridors would be used as secondary routes.

The analysis area is in ITD District 4. ITD manages I-84 and U.S. 93. Multiple local highway districts in the analysis area have management responsibilities for other roadways. These include the Shoshone No. 2, Dietrich, Kimama, Minidoka, Hillsdale, and Jerome Highway Districts. The portion of ID 24 in the analysis area is in the Dietrich Highway District.

3.14.1.1.2 INTERSECTIONS

Twelve existing intersections in the analysis area could be used to access the siting corridors during construction and operation. Most of these occur along I-84, U.S. 93, ID 24, and ID 25, and two occur on collector roads at bridge crossings (see Figure 3.14-2).

3.14.1.1.3 TRAFFIC VOLUME AND LEVEL OF SERVICE

Roads in the analysis area are used by passenger and commercial vehicles. The primary commercial transportation in the analysis area is farming-related or interstate commercial trucking on I-84. Most (95%–99%) of the project construction vehicles would access the siting corridors along U.S. 93 and ID 24 (Mott MacDonald 2021a). For this reason, MVE's *Transportation Assessment for the Lava Ridge Wind Project* (Mott MacDonald 2021a) evaluated project effects to the roadway capacity LOS for these two delivery routes only. Current LOS and AADT from 2010 and 2019 for primary delivery routes U.S. 93 and ID 24 are provided in Table 3.14-3. LOS for a two-lane roadway is a function of roadway congestion and is based on a number of factors including 1) the percentage of time spent following a slower vehicle or 2) average travel speed of vehicles using the roadway (Mott MacDonald 2021a). LOS ratings range from A to F, with A being the least congested and F being the most congested. An LOS of D or better is considered acceptable by ITD for peak hour conditions (ITD 2013). The LOSs for primary delivery routes U.S. 93 and ID 24 are A through D (see Table 3.14-3). In general, traffic counts are higher closer to the developed I-84 corridor. Traffic along ID 24 where most of the siting corridor entrances would be located is lower, and current LOSs are better compared to U.S. 93 or I-84.

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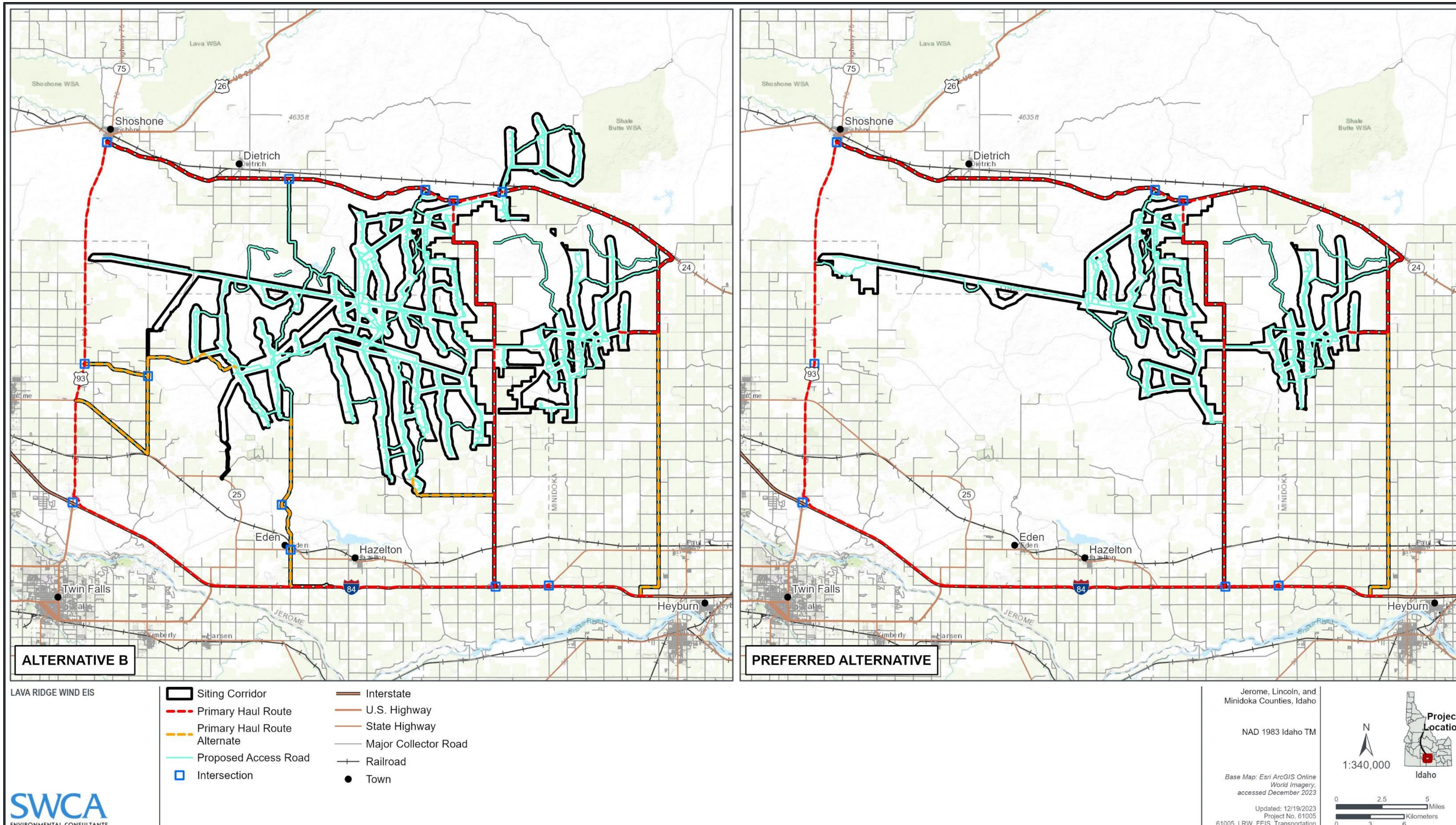

Figure 3.14-2. Primary haul routes, intersections, and proposed access roads in and near the siting corridors.

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Table 3.14-2. Major Roadways in the Analysis Area

Roadway	Extent in Analysis Area	Infrastructure	Reasonably Foreseeable Future Actions	Speed Limit
I-84	Milepost 173.0 at U.S. 93 intersection east to milepost 200.5 at ID 25 intersection.	Four-lane divided freeway with grade-separated interchanges	The I-84/ID 50 Kimberly Interchange Project will rebuild the Kimberly Interchange to address safety, functionality, and future regional and local growth.	80 miles per hour (mph)
U.S. 93	Milepost 53.0 at I-84 intersection north to ID 24 intersection at milepost 73.2 in Shoshone, Idaho.	Two-lane undivided highway, paved Four-lane divided highway near I-84 and ID 25 intersections	The U.S. 93 corridor from I-84 to ID 25 has undergone several improvements by ITD to increase roadway capacity and improve safety since early 2017. The final (fourth) phase of improvements on U.S. 93, from just south of the Eastern Idaho Railroad crossing to East 300 South is currently in design and proposed for construction in 2023 and 2024.	55–65 mph (35–45 mph near Shoshone and ID 24/I-84 intersections)
ID 24	Milepost 67.5 at U.S. 93 intersection in Shoshone, Idaho, east to milepost 44.8 at Sid Road intersection.	Two-lane paved undivided highway	None	65–55 mph (35 mph near Shoshone and U.S. 93 intersection)
ID 25	Milepost 5.3 at U.S. 93 intersection southeast to milepost 30.5 at I-84 intersection at Ridgeway Road.	Two-lane paved undivided highway	None	55 mph (25–35 mph through Eden and Hazelwood)
Idaho Street North/South Eden Road	From ID 25 intersection in town of Eden, Idaho Street North (between milepost 104.5 and 104.79) turns into South Eden Road north of Eden and ends at milepost 113.5.	Two-lane paved road	None	Unknown*
East 200 North/East 170 North (Red Bridge Road)	From milepost 109.3 at U.S. 93 intersection, East 200 North turns into East 170 North (at milepost 111) and ends at milepost 113 at intersection of North 800 East.	Two-lane paved road	None	Unknown*
North 800 East	Milepost 107 at East 170 North intersection up to milepost 108.	Two-lane paved road	None	Unknown*
950 Road East	Milepost 105.3 at ID 24 intersection south to Star Lake Road at milepost 100.	Two-lane road; partially paved road (nearest to ID 24) and partially dirt road (further from ID 24)	None	Unknown*
Owinza Road	Intersects with ID 24 (at milepost 49.2 of ID 24) and heads south.	Dirt road	None	Unknown*
South 1850 East (Bingham Road)	Milepost 102.3 at ID 24 intersection, south to milepost 101.	Dirt road	None	Unknown*

Roadway	Extent in Analysis Area	Infrastructure	Reasonably Foreseeable Future Actions	Speed Limit
Sid Road	Milepost 103 at ID 24 intersection south to milepost 100.	Dirt road	None	Unknown*
East 990 South	Milepost 108.2 at intersection of South 2700 East to milepost 111.1 at ID 25 intersection.	Two-lane paved road	None	Unknown*
Crestview Road	Milepost 100 at intersection of East 990 South north to milepost 113 at county line; becomes South 2050 East in Lincoln County and continues north from milepost 100 to milepost 103.5.	Two-lane road; partially paved road (nearest to I-84) and partially dirt road (further from I-84)	None	Unknown*

Source: ITD (2020a).

* Speed limit data for county roads are not available through ITD or county websites.

Table 3.14-3. Annual Average Daily Traffic and Level of Service for U.S. Highway 93 and Idaho Highway 24 in the Analysis Area

Roadway	Current LOS	2019 AADT* (vehicles per day)	Comments
U.S. 93	B	Passenger: 4,440–16,700 Commercial: 860–2,300 Combined: 5,300-19,000 (12,150 average)	2019 AADT counts increased significantly near the I-84 corridor, with the highest counts occurring at the interchange with I-84 (I-84 milepost 173). Most of the U.S. 93 segments from East 100 North to ID 24 (approximately 12 miles) have an LOS B.
ID 24	A	Passenger: 380–1,600 Commercial: 130–200 Combined: 510–1,800 (1,155 average)	2019 AADT traffic counts increased near Shoshone and U.S. 93.

Sources: ITD (2020b); Mott MacDonald (2021a).

Note: A short segment of U.S. 93 north of ID 25 was modeled in Mott McDonald (2021a) as currently LOS D because this segment was two-lane highway in 2021. This segment has since been improved to four-lane highway and the EIS assumes it now has an LOS of B.

3.14.1.1.4 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have influenced and would continue to influence transportation in the analysis area in various ways. Trends and actions in the analysis area and in the siting corridors (as described in EIS Section 3.1.1 [Existing and Future Trends and Actions]) affecting transportation resources include general population growth, increased renewable energy development, commercial expansion along I-84 and U.S. 93, and the construction of existing and proposed linear features (e.g., roads, railroads) and roadway improvement projects. Collectively, these trends and actions have, and would continue to, contribute to gradual increases in roadway traffic volumes and traffic congestion over time (e.g., increases in roadway traffic in concentrated areas of population growth or areas of commercial expansion). Traffic volumes related to the population growth and development of linear features in the analysis area are reflected in the AADT and LOS provided in Table 3.14-3. The I-84/ID 50 Kimberly Interchange Project and the U.S. 93 improvements (see Figure 3.14-1) are future actions proposed by ITD to address existing traffic congestion and future growth in the analysis area (see Reasonably Foreseeable Planned Actions column in Table 3.14-2 and text in EIS Section 3.1.1). Previously completed improvements along the U.S. 93 corridor (from I-84 to ID 25) have helped to increase roadway capacity and improve safety in that area.

Construction of future development actions, including ITD proposals and renewable energy development, would temporarily affect traffic patterns in the local area through lane closures and detours, increased construction traffic volumes, and increased travel times. In the long term, traffic patterns would benefit from the ITD proposals. Given the number of development actions planned in the analysis area over the next 5 years, there is potential for construction phases among multiple projects to overlap and increase traffic impacts.

3.14.1.2 Impacts

3.14.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and transportation would only be affected by existing and future trends and actions.

3.14.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would add vehicle traffic to existing major public roads, which could change traffic patterns or levels of congestion on some roads. Alternative B would generate a total of 812,882 one-way trips during the 2-year construction phase, with an average of 7,724 trips per week or 1,103 trips per day (Table 3.14-4) (RCC 2022). These estimates assume a construction workforce of 829 workers associated with the peak week of construction activity; however, the number of construction workers would be lower than 829 during all other weeks of construction. For example, the number of construction workers is projected to be less than 600 for most (70%) of the 2-year construction phase, and the number of construction workers would be less than 200 for approximately 27% of the 2-year construction phase (RCC 2022). As a result, the number of weekly, daily, and hourly construction trips would vary throughout the 2-year construction phase in proportion to the number of construction workers, with the highest number of trips occurring during the peak week of construction (14,198 weekly trips), and then falling to less than 6,000 weekly trips for almost half (47%) of the 2-year construction phase. Similarly, daily trips would range from 11 to 2,032, and hourly trips would range from 1 to 170 (see Table 3.14-4). EIS Table 2.4-3 in EIS Chapter 2 provides additional trips-per-hour estimates during construction and operation for each of the action alternatives.

Of the 812,882 total trips generated during construction, most would be associated with construction vehicles (57%) (e.g., all vehicles used for materials, equipment, concrete, and other aggregate) and passenger vehicles (40%) (e.g., workers' vehicles), and the remainder would be heavy haul (0.8%) (e.g., vehicles used for crane and turbine deliveries) and support vehicles (1.4%) (e.g., bulldozers, graders, support cranes, compacters, and forklifts). Construction-related vehicles would temporarily change traffic patterns on U.S. 93 and ID 24 in the analysis area through increased passenger and commercial trips, temporary lane closures and detours during proposed roadway improvements at siting corridor entrances, and increased congestion and travel times. It is unlikely that construction traffic would affect I-84 or other roadways near the I-84 corridor where exiting traffic counts are high. However, short-term delays at intersections along the haul route may occur during turbine component delivery.

The estimated increase in daily traffic volumes during the peak week of construction (2,032 trips per day) would be a 16.7% increase over existing AADT passenger and commercial counts on U.S. 93 (average combined 12,150 trips per day) and a 176.7% increase over existing AADT passenger and commercial counts on ID 24 (average combined 1,150 trips per day). Table 3.14-5 summarizes changes in AADT from the project.

Table 3.14-4. Vehicle Trip Estimates by Action Alternative

Project Phase	Alternative B	Alternative B with Additional Measures	Alternative C	Alternative D	Alternative E	Preferred Alternative
Construction* (2–3 years)	812,882 trips total 1,103 average trips/day Range: 11–2,032 trips/day	1,057,221 trips total 1,369 average trips/day Range: 14–2,639 trips/day	1,026,582 trips total 1,329 average trips/day Range: 13-2,563 trips/day	669,985 trips total 909 average trips/day Range: 9–1,671 trips/day	840,414 trips total 1,075 average trips/day Range: 11–2,097 trips/day	748,878 trips total 968 average trips/day Range: 10–1,866 trips/day
Operation (30 years)	901,740 trips total 38 average trips/day Range: 38–134 trips/day	901,740 trips total 38 average trips/day Range: 38–134 trips/day	868,043 trips total 37 average trips/day Range 37–134 trips/day	630,704 trips total 27 average trips/day Range: 27–134 trips/day	608,269 trips total 26 average trips/day Range: 26–134 trips/day	545,868 trips total 23 average trips/day Range: 23–134 trips/day
Decommissioning* (2–3 years)	713,076 trips total 1,270 average trips/day Range: 13–1,830 trips/day	814,210 trips total 1,261 average trips/day Range: 15–2,086 trips/day	801,539 trips total 1,241 average trips/day Range: 15–2,053 trips/day	599,800 trips total 1,068 average trips/day Range: 11–1,535 trips/day	643,348 trips total 958 average trips/day Range: 12–1,647 trips/day	631,837 trips total 978 average trips/day Range: 12–1,617 trips/day

Note: All trips are one-way. Trips would occur during work hours, which are 12 hours per day during construction and 8 to 12 hours per day during operation.

* The duration of construction and decommissioning would be 2 years for Alternative B and 3 years for Alternatives C through E and the Preferred Alternative (see EIS Section 2.3.3).

Table 3.14-5. Changes in Annual Average Daily Traffic by Action Alternative

Project Phase	Alternative B	Alternative B with Additional Measures	Alternative C	Alternative D	Alternative E	Preferred Alternative
Construction* (2–3 years)	16.7% increase U.S. 93 176.7% increase ID 24	21.7% increase U.S. 93 228.5% increase ID 24	21.1% increase U.S. 93 222.0% increase ID 24	13.8% increase U.S. 93 144.7% increase ID 24	17.3% increase U.S. 93 181.6% increase ID 24	15.4% increase U.S. 93 161.6% increase ID 24
Operation (30 years)	1.1% increase U.S. 93 11.7% increase ID 24	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B	Same as Alternative B
Decommissioning* (2–3 years)	15.1% increase U.S. 93 159.1% increase ID 24	17.2% increase U.S. 93 180.6% increase ID 24	16.9% increase U.S. 93 177.7% increase ID 24	12.6% increase U.S. 93 132.9% increase ID 24	13.6% increase U.S. 93 142.6% increase ID 24	13.3% increase U.S. 93 140.0% increase ID 24

Note: Table describes changes to the average combined passenger and commercial AADT on major public roads. Existing AADT are described in Table 3.14-3.

* The duration of construction and decommissioning would be 2 years for Alternative B and 3 years for Alternatives C through E and the Preferred Alternative (see EIS Section 2.3.3).

Based on the distribution of population centers to the siting corridors, most of the construction workers would be coming from the west and south on U.S. 93 from Jerome and Twin Falls (Mott MacDonald 2021a). Therefore, most project vehicle trips would occur along U.S. 93 and ID 24, and vehicles would primarily enter the siting corridors from intersections off ID 24. Increased volumes of construction vehicles and those vehicles slowing at siting corridor entrances would increase the traffic volume and cause delays at entrances during construction. In addition, directional volumes on U.S. 93 and ID 24 would change with more traffic going north on U.S. 93 and east on ID 24 in the morning and west on ID 24 and south on U.S. 93 in the afternoon.

Based on trip generation estimates for the peak week of construction, the LOS for U.S. 93 and ID 24 would be reduced as a result of the additional peak hour construction traffic (Table 3.14-6). All segments of U.S. 93 and ID 24 would maintain an LOS D or better, which ITD considers acceptable for peak hour conditions (ITD 2013). A short segment of U.S. 93 north of ID 25 was modeled in Mott McDonald (2021a) as LOS D, which during peak week of project construction would have been reduced to LOS E because this segment was a two-lane highway in 2021. This segment has since been improved to a four-lane highway, and the EIS assumes it now has the same current LOS B as its other segments. Therefore Table 3.14-6 forecasts all segments of U.S. 93 would be LOS D during peak week of construction. Traffic management strategies such as staggered work hours or incentives for carpooling would be considered to minimize this impact. Oversized vehicles on U.S. 93 and ID 24 may be scheduled to use these roadways during daytime off-peak hours to avoid traffic delays. Degraded LOS conditions are based on the peak week of construction and would not occur during the entire 2-year construction phase because the number of construction workers and associated trips would be reduced during non-peak periods.

Table 3.14-6. Forecasted Peak Construction Week Levels of Service under All Action Alternatives

Roadway Segment	Current LOS	Forecasted LOS
U.S. 93 (ID 25 to East 100 North)	B	D
U.S. 93 (East 100 North to East 200 North)	B	D
U.S. 93 (East 200 North to ID 24)	B	D
ID 24 (U.S. 93 to Stoker Road)	A	B

The use of alternate primary delivery routes may redistribute some of the construction trips from U.S. 93 and ID 24 to alternate routes, resulting in reduced traffic volumes along U.S. 93 and ID 24. However, the use of alternate primary routes is not expected to affect the LOS forecasts in Table 3.14-6. For example, using a conservative assumption that 10% of the trips that would have otherwise used U.S. 93 are redistributed to alternate primary routes, the LOS along U.S. 93 would remain unchanged from those shown in Table 3.14-6.

Some or all of the intersections analyzed in Mott MacDonald (2021a) would require some improvements to accommodate turning requirements for construction vehicles, and to resolve other conflicts with road signs, property fences, light poles, height clearances, fire hydrants, or buildings. Intersection improvements and traffic signal timing adjustments may be needed to accommodate increased traffic volumes during construction. Additionally, there are four bridges identified in Mott MacDonald (2021a) (one along U.S. 93, two along ID 24, and one along 750 East Road) that may require improvements to accommodate anticipated vehicle loads. Temporary lane restrictions, road closures, or other traffic delays would occur during roadway improvements.

Alternative B's increased volumes of heavy equipment and truck traffic on public roads during construction would contribute to the deterioration of roadways. MVE would coordinate with ITD and the local highway districts to determine if additional maintenance would be required and to coordinate on repairs to roadways following project construction. As stated in Section 1.3.9 of MVE (2023) (EIS Appendix 1), all existing public roads that are used or improved by MVE during project construction would be left in a condition that is as good as or better than their condition when the construction phase begins.

Once in the siting corridors, transportation would be limited to project roads (applicant-committed measure 31). Public access on these roads would be restricted during construction, and therefore impacts to public users on roads internal to the siting corridors would not occur.

Carpooling among construction workers would be encouraged to the extent practical to reduce the number of vehicles entering and exiting the site daily (applicant-committed measure 39). In the event efficiencies can be gained in transporting project materials to site by rail, a UPRR rail line with several existing sidings running parallel to ID 24 may be used to reduce vehicle traffic (applicant-committed measure 36). Traffic-control measures would include traffic-control personnel, warning signs, lights, and barriers during construction to ensure safety and to minimize traffic congestion (applicant-committed measure 32). Construction personnel would also be instructed and required to adhere to speed limits commensurate with road types, traffic volumes, vehicle types, and site-specific conditions to ensure safe and efficient traffic flow and to reduce wildlife collisions and disturbance and airborne dust (applicant-committed measure 33). Also, roads negatively affected by construction would be returned to preconstruction conditions (applicant-committed measure 38).

Operation and maintenance of the project would generate a total of 901,740 trips, with an average of 38 trips per day and a maximum of 134 trips per day. Most of the operation and maintenance trips would be associated with passenger vehicles. The maximum number of operation and maintenance workers commuting to the site on a single day would be 75; however, the number of operation and maintenance workers would be closer to 20 during operation. These additional trips would have no noticeable effect on existing roadways within the analysis area, and existing LOS would remain unchanged.

The total number of one-way trips generated during the approximately 2-year decommissioning phase would be 713,076, with an average of 1,270 trips per day (see Table 3.14-4). The magnitude and duration of transportation impacts during decommissioning would be similar to those described for construction because similar activities would occur. There would be a temporary increase in traffic on roadways and at siting corridor entrances during the 2-year decommissioning phase. Following decommissioning, there would be no traffic associated with the project. The turn lanes and other traffic improvements along ID 24 for siting corridor entrances would remain following decommissioning.

MVE's applicant-committed measures 31–42 (see Table App4-2e in EIS Appendix 4) would be implemented and would reduce potential impacts to traffic patterns in the analysis area during construction and operation by limiting use of roads outside work areas, through the use of traffic control measures, by repairing and restoring roads postconstruction, and by coordinating any changes to traffic patterns with local authorities and right-holders within the siting corridors.

Of all the action alternatives, Alternative B would have the greatest traffic impacts in the analysis area.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for traffic patterns are summarized in Table 3.14-7 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.14-7. Mitigation for Traffic Patterns

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
31–42	–	a
–	–	hh

Note: All measures are detailed in EIS Appendix 4.

Measure a would extend MVE's applicant-committed measures related to roads and traffic to all project phases, including maintenance during operation and decommissioning. Although measure hh is primarily intended to reduce potential impacts to big game, it would also reduce potential impacts to traffic patterns in the analysis area by limiting operational traffic volumes associated with winter road maintenance.

Additional measures that could be implemented to minimize and avoid impacts to wildlife are provided in Table 3.18-4 and include seasonal timing restrictions for construction and decommissioning phases. Implementation of these measures would extend the duration of construction and decommissioning phases for Alternative B from 2 to 3 years, resulting in an increased number of total trips associated with these phases (see Tables 3.14-4 and 3.14-5). The increased quantity of traffic and changes in AADT under Alternative B with additional measures would not be large enough to further degrade the forecasted LOS in Table 3.14-6.

3.14.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types of traffic impacts under Alternative C would be the same as Alternative B; however, the quantity of traffic and changes in AADT under Alternative C would be higher than under Alternative B (see Tables 3.14-4 and 3.14-5), and may be large enough to further degrade the forecasted LOS in Table 3.14-6. Alternative C would have the highest traffic impacts of the action alternatives.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to traffic patterns.

3.14.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The traffic impacts from Alternative D would be reduced compared to Alternative B. During the peak week of construction, Alternative D would have approximately 18% fewer trips than Alternative B and fewer changes in AADT, which would reduce the potential for degraded LOS conditions. Alternative D would have the fewest construction- and decommissioning-related traffic impacts of the action alternatives. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to traffic patterns.

3.14.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Under Alternative E, traffic impacts during most phases would be reduced compared to Alternatives B and C, but greater than Alternative D and the Preferred Alternative. Construction traffic impacts would be fewer than Alternative C but greater than Alternative B, Alternative D, and the Preferred Alternative. Decommissioning traffic impacts for Alternative E would be fewer than Alternatives B and C but would be more than Alternative D and the Preferred Alternative. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to traffic patterns.

3.14.1.2.6 PREFERRED ALTERNATIVE

Under the Preferred Alternative, traffic impacts would be reduced compared to Alternatives B, C, and E. During the peak week of construction, the Preferred Alternative would have approximately 8% fewer trips than Alternative B and fewer changes in AADT, which would reduce the potential for degraded LOS conditions. The Preferred Alternative would have the second-fewest construction- and decommissioning-related traffic impacts of the action alternatives. The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly minimize the potential effects to traffic patterns.

3.14.1.2.7 CUMULATIVE IMPACTS

The recently completed improvements on U.S. 93 from I-84 to ID 25 will help accommodate the additional traffic generated by the project. The final phase of improvements from just south of the Eastern Idaho Railroad crossing to East 300 South is proposed for construction in 2023 and 2024, which would likely be completed before construction of the Lava Ridge Wind Project. However, in the event of any schedule changes or delays, the combined traffic impacts from both projects could exacerbate congestion for that segment of U.S. 93 and could impact the delivery of construction materials to the siting corridors (e.g., alternate delivery routes may be considered). MVE would coordinate with IDT to determine if adjustments to delivery routes or schedules are needed in the event of concurrent construction phases for both projects. Overlapping construction phases with proposed renewable energy developments in the project vicinity could also exacerbate traffic impacts if proposed access routes are being used by more than one project; however, access routes for proposed renewable energy developments are not known at this time. Reasonable measures to accommodate the construction of various projects concurrently would be determined through MVE coordination with ITD, as necessary.

3.14.1.3 Significance Determination

Under all action alternatives, potential adverse effects to traffic patterns would not be significant. During the construction and decommissioning phases there would be short-term adverse effects on traffic patterns from increased vehicle and heavy haul trips, as well as temporary lane closures, detours, and increased congestion and travel times. All segments of U.S. 93 and ID 24 would maintain an LOS D or better, which ITD considers acceptable for peak hour conditions (ITD 2013). Project traffic during the 30-year operation phase would have no noticeable effect on existing roadways within the analysis area, and existing LOS would remain unchanged.

3.14.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The project would not result in irreversible or irretrievable impacts to transportation resources.

3.15 VEGETATION

3.15.1 Native Upland Vegetation Communities

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.15-1.

Table 3.15-1. Analysis Approach for Native Upland Vegetation Communities

Issue Analyzed in Detail	How would the project affect native upland vegetation communities? Native vegetation communities are defined here as having native species dominating or co-dominating the plant community; nonnative species may also be present.
Associated Issues Analyzed in Brief	AIB-41: Would project ground disturbance cause the introduction and spread of weeds and other invasive plant species? How would the introduction of weeds and invasive species affect revegetation success? AIB-42: How would project ground disturbance affect vegetation cover? AIB-43: How would the project affect threatened and endangered plant species? AIB-44: How would vegetation phenology, and subsequently pollinators and plant reproductive success, be affected by changes to ground-level temperatures and humidity levels from turbine operation? AIB-59: Would dust from project roads affect vegetation, wildlife, and invertebrates?
Analysis Area	The siting corridors for Alternative B because this area captures where project ground disturbance and habitat alteration of vegetation communities would occur (Figure 3.15-1).
Indicators	Acres of ground disturbance in native upland vegetation communities.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years for grasslands and 50 years for sagebrush communities to reestablish after final reclamation, for a total of 84 to 86 years. Areas with very fragile soils are unlikely to be successfully restored and would remain permanently disturbed following the project.
Data Sources	NRCS Ecological Site Descriptions (NRCS 2006). LANDFIRE Existing Vegetation Type data (USGS and DOA 2013). Project baseline reports for vegetation communities (WEST 2020, 2021). BLM AIM data for vegetation (BLM 2022a) and seeding data (BLM 2022b).
Assumptions	The duration of full recovery of sagebrush communities varies widely from as short as 9 years to as long as 120 years depending on the site and the species. Recovery time for Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has been observed at 9 years (96% recovery at one site in southwestern Montana) (Wambolt et al. 2001), 32 years (72% recovery at another site in southwestern Montana) (Wambolt et al. 2001), 50 to 75 years (Bunting et al. 2002), and 50 to 120 years (Baker 2006; Cooper et al. 2007). Native perennial grasslands may recover more quickly, but they also require several decades to return to pre-disturbance conditions (Allington and Valone 2011). Given the variability of reported recovery timeframes, this EIS analysis assumes a 50-year time frame for re-establishment of mature native sagebrush communities and a 5-year timeframe for native perennial grasslands.

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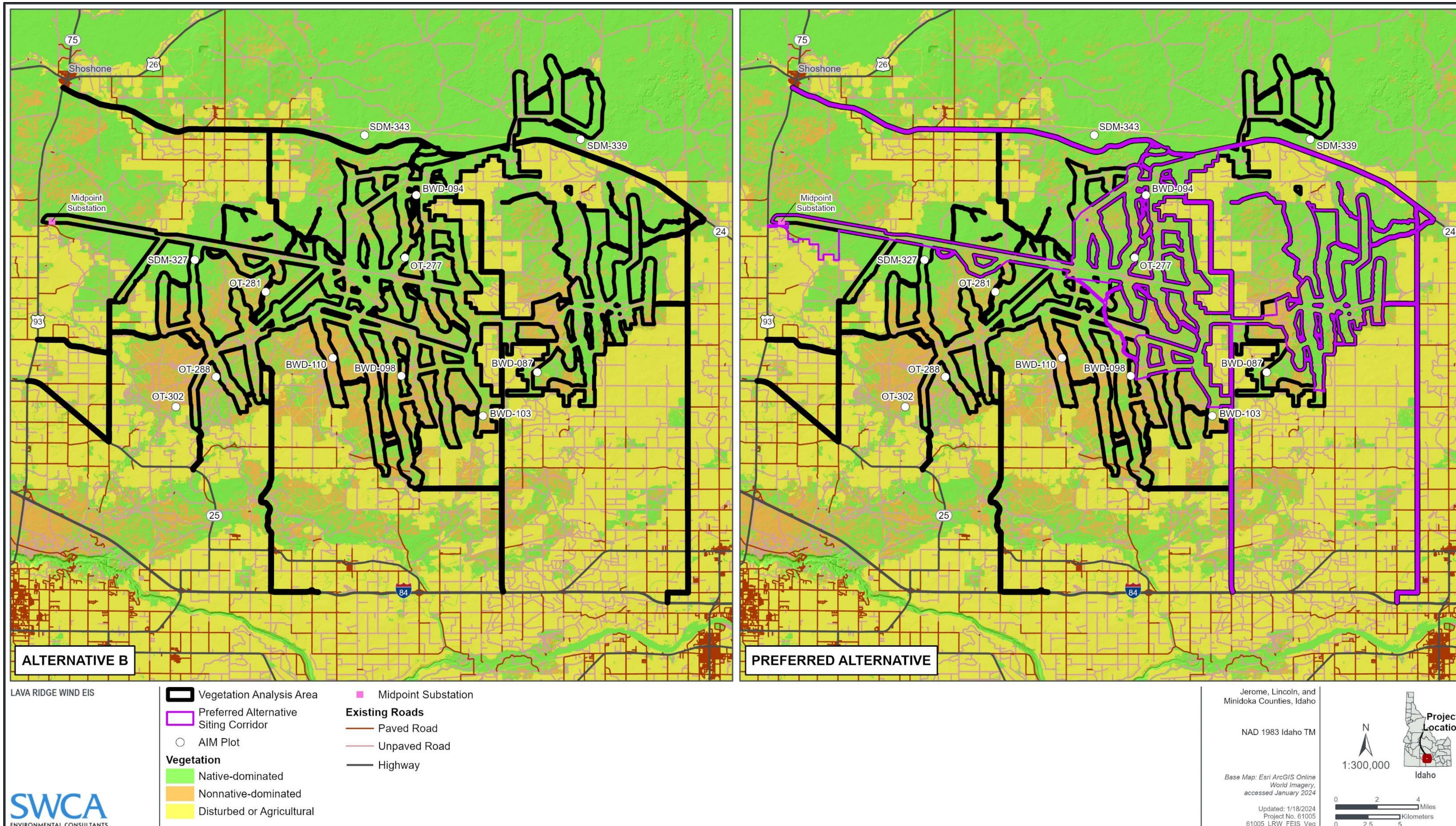

Figure 3.15-1. Vegetation analysis area.

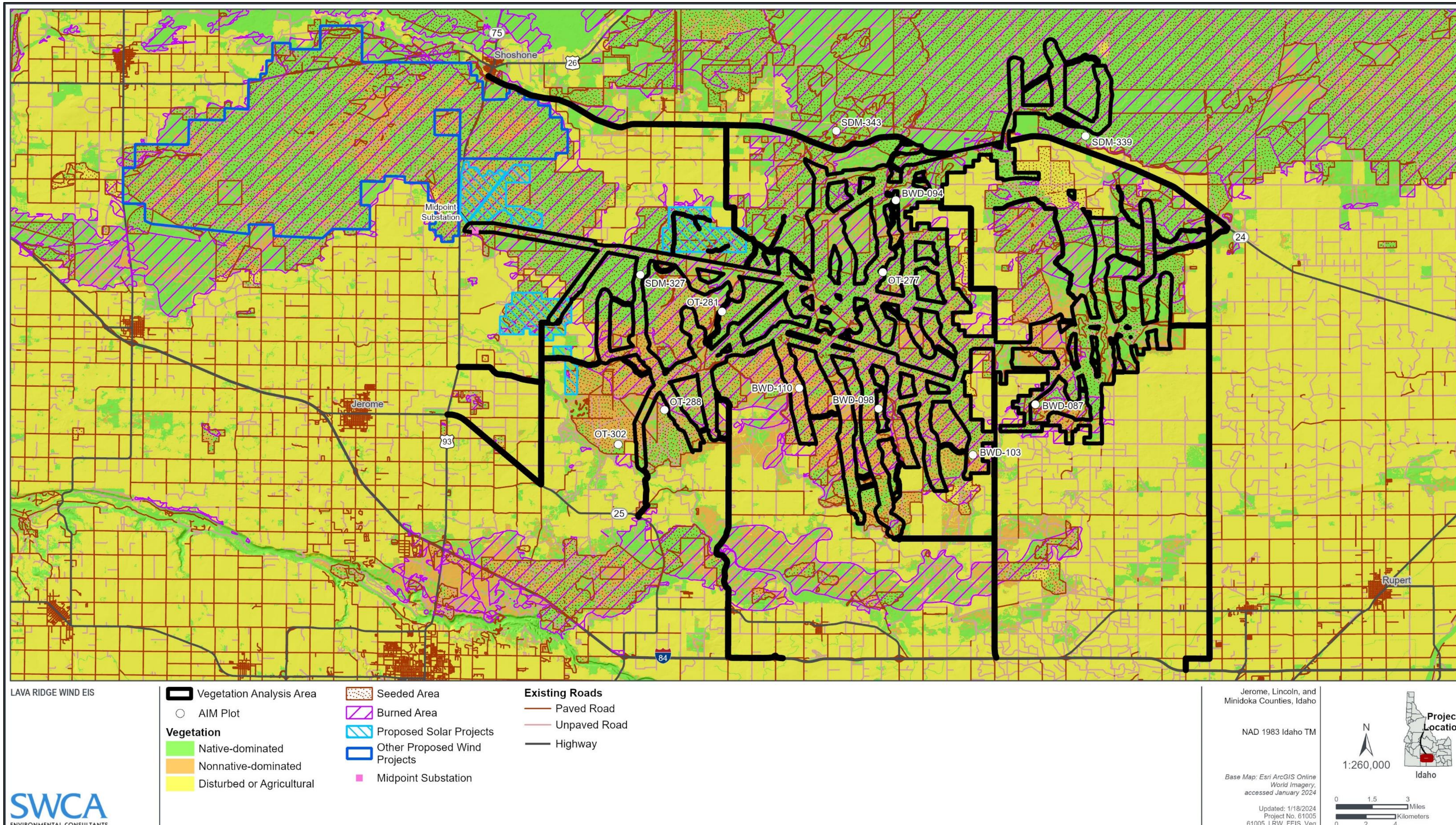

Figure 3.15-2. Existing and future trends and actions in the vegetation analysis area.

3.15.1.1 Affected Environment

The analysis area is in the Eastern Snake River Basalt Plains and Magic Valley Ecoregions, which are valley and plain landscapes that are dominated by sagebrush steppe but also include irrigated agriculture and development (McGrath et al. 2002). Topography in the analysis area is relatively flat with elevations ranging from approximately 4,000 to 5,000 feet. The average annual temperature in the analysis area is 41 to 55 degrees Fahrenheit. The freeze-free period for the analysis area averages 165 days and typically ranges from 110 to 220 days (NRCS 2006). The primary land use in the analysis area is open range livestock grazing, and the area is bordered by relatively large tracts of land used for center pivot–irrigated agriculture. A number of small buttes, wetland depressions, and playas are located across the analysis area. The Milner-Gooding and Dietrich Main Canals cross the southwest, northwest, and north portions of the analysis area.

There are 50,483 acres of mapped upland native vegetation-dominated plant communities in the analysis area (the siting corridors) (see Figure 3.15-1). These plant communities are composed mostly of sagebrush steppe habitat (31,613 acres or 38% of the analysis area) and grasslands (11,805 acres or 14% of the analysis area), with typical, native vegetation including several species of sagebrush, yellow and rubber rabbitbrush, and numerous perennial bunchgrass and forb species (USGS and DOA 2013). However, changes to plant communities may have occurred since they were mapped in 2013. Several wildfires have occurred in and adjacent to the analysis area between 1980 and 2022 (years for which wildfire data are available), which, combined with livestock grazing, have resulted in alterations to native vegetation with the introduction of nonnative plants dominated by cheatgrass and crested wheatgrass. The BLM has also completed seeding projects (for perennial grasses and in some areas for sagebrush) on 61,957 acres (74%) of the analysis area (see Figure 3.15-2). Approximately 39,876 acres (79%) of the mapped native upland vegetation communities in the analysis have been seeded (BLM 2022b). Of the 61,957 acres of seeding projects, 49,007 acres (79%) overlap previously burned areas. Species used in reseeding were selected due to their ability to establish readily in a difficult environment, provide deep-rooted structure, and compete against invasive annuals. These species were generally more productive grasses than the native bunchgrasses, such as Sandberg bluegrass. Areas that have been reseeded may now likely be dominated by grasslands (both native and nonnative).

AIM vegetation data are available for the siting corridors. AIM is a nationwide effort to monitor natural resource conditions on BLM public land using standardized strategies. Five AIM plots in the siting corridors (BWD-103, BWD-110, OT-277, OT-281, and SDM-327; see Figure 3.15-1) and seven plots within 1 mile of the siting corridors (BWD-087, BWD-094, BWD-098, OT-288, OT-302, SDM-339, and SDM-343) (BLM 2022a) are summarized in Table 3.15-2. Native grass foliar cover, comprising primarily Sandberg bluegrass, was generally higher at AIM plots within the siting corridors (36.3%–76.6%; mean 51.4%) than those within 1 mile of the siting corridors (12.7%–118.0%; mean 33.9%). Nonnative grass foliar cover, comprising primarily cheatgrass, was generally higher at AIM plots within 1 mile of the siting corridors (11.3%–82.7%; mean 57.5%) than those within the siting corridors (22.3%–82.7%; mean 46.7%). Only four AIM plots had more than 10% foliar cover of other nonnative species, comprising primarily tall tumblemustard (*Sisymbrium altissimum*). Sagebrush was only present along one of the foliar cover transects for AIM plots within the siting corridors, SDM-327, where sagebrush foliar cover was 1.3%. Four AIM plots within 1 mile of the siting corridors (BWD-087, BWD-094, OT-302, and SDM-343) had sagebrush present along their foliar cover transects; sagebrush foliar cover at these plots varied from 0.7% to 7.3%. Native sagebrush was also recorded along the species richness transects at BWD-110, OT-281, OT-288, and SDM-339 but was not present within their foliar cover transects.

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Table 3.15-2. Summary of Assessment, Inventory, and Monitoring Data within 1 Mile of the Siting Corridors

Plot ID	**BWD-103**		**BWD-110**		**OT-277**		**OT-281**		**SDM-327**		BWD-087		BWD-094		BWD-098		OT-288		OT-302		SDM-339		SDM-343	
Species Richness	**16 native**	**10 nonnative**	**15 native**	**9 nonnative**	**7 native**	**10 nonnative**	**11 native**	**6 nonnative**	**14 native**	**6 nonnative**	6 native	6 nonnative	6 native	7 nonnative	11 native	10 nonnative	8 native	7 nonnative	5 native	5 nonnative	28 native	7 nonnative	22 native	7 nonnative
Nonnative grasses	**38.00%**		**82.70%**		**58.70%**		**22.30%**		**32.00%**		66.70%		66.00%		11.30%		60.70%		46.00%		76.60%		75.30%	
Other nonnatives	**4.70%**		**24.00%**		**2.70%**		**1.30%**		**10.00%**		36.70%		16%		8.00%		26.10%		7.30%		4.00%		8.00%	
Native grasses	**51.30%**		**36.30%**		**52.70%**		**56.60%**		**60.00%**		12.70%		26.70%		118.00%		20.60%		13.40%		14.10%		32.00%	
Native sagebrush	**0%**		**0%***		**0%**		**0%***		**1.30%**		5.30%		2.70%		0%		0%*		0.70%		0%*		7.30%	
Other native	**3.30%**		**4.70%**		**0%**		**0.70%**		**4.00%**		0%		0%		3.40%		0%		0.70%		12.70%		4.00%	

Sources: BLM (2022a).

Notes: Plot IDs in bold are within the siting corridors. Foliar cover percentages may total more than 100% because there can be several overlapping vegetation stories within each plot.

* Although there was no native sagebrush present along the foliar cover transect for this plot, native sagebrush was detected along the plot's adjacent species richness transect.

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Species richness was relatively high at plots in the siting corridors (17–26 species) and included a mixture of native and nonnative grasses and forbs. Native shrubs such as broom snakeweed (*Gutierrezia sarothrae*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus*) were also present. Native species accounted for roughly 60% to 70% of the species diversity at these plots, except OT-277 where only 41% of species observed were native. At most plots within 1 mile of the siting corridors, species richness was lower (12–21 species) and was split almost evenly between native and nonnative species. However, SDM-339 and SDM-343 had the highest species richness (35 and 29 species, respectively) and the highest proportion of native species (80% and 76%, respectively).

Vegetation composition was also recorded at 20 plots (10 of which are located in the analysis area) during special-status vegetation surveys for the project (WEST 2020). Many of the plots had burned within the last 5 years and had high cheatgrass cover (70%–80%); all but one of the plots in the northern portion of the siting corridors had lower cheatgrass cover (0%–30%) including the two plots that had recently burned. Conversely, crested wheatgrass was absent from all but one plot in the southern portion of the siting corridors, but was present at all but one plot in the northern portion of the siting corridors. Native grasses and forbs were absent from most plots in the siting corridors; however, the surveys occurred in late July when many native forbs would have been difficult to detect. Sagebrush cover was highest at plots in the eastern portion of the siting corridors and was absent at most plots in the western portion of the siting corridors.

Although much of the analysis area is mapped as native sagebrush steppe and grasslands, the AIM (BLM 2022a) and WEST (2020) data confirm that current vegetation conditions in much of the analysis area are predominantly disturbed and composed of nonnative grasses, primarily due to past wildfires and livestock grazing. Disturbed vegetation communities throughout the analysis area are likely in varying states of recovery based on the time since disturbance and the degree to which active recovery and restoration measures have been implemented. Although this makes it difficult to determine the current extent of native upland vegetation communities in the analysis area, because existing disturbance is substantial, any remaining intact native sagebrush communities are unique and valuable. These native upland vegetation communities also serve as important habitat for native wildlife species.

The duration of full recovery of mature sagebrush communities varies widely from as short as 9 years to as long as 120 years depending on the site and the species. Recovery time for Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has been observed at 9 years (96% recovery at one site in southwestern Montana) (Wambolt et al. 2001), 32 years (72% recovery at another site in southwestern Montana) (Wambolt et al. 2001), 50 to 75 years (Bunting et al. 2002), and 50 to 120 years (Baker 2006; Cooper et al. 2007). Native perennial grasslands may recover more quickly, but they also require several decades to return to pre-disturbance conditions (Allington and Valone 2011). Given the variability of reported recovery timeframes, this EIS analysis assumes a 50-year time frame for re-establishment of mature sagebrush communities and 5-year time frame for re-establishment of native grassland communities. There are approximately 3,814 acres of very fragile soils in the analysis area, 1,206 acres of which occur in native upland vegetation communities; reclamation and revegetation are unlikely to be successful in these soils, and any disturbance that occurs in these soils would be permanent.

3.15.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Land use conversions (conversion of open space to agricultural, urban, or rural residential), energy and transportation infrastructure and ROWs, wildfire, invasion by nonnative species, and other existing and future trends and actions (such as grazing and OHV use) have and will continue to influence native upland vegetation-dominated communities in the analysis area through degradation, fragmentation, and loss of habitat. Approximately 30,486 acres (36%) of the analysis area are dominated by nonnative plant species, have been converted to agriculture or rural residential, are disturbed (contain roads and other development), are proposed for other renewable energy development, or are existing ROWs (which may be subject to ongoing and future surface and vegetation-disturbing activities and pesticide application for vegetation management) (see Figure 3.11-2). Approximately 572 acres (1%) of the 50,483 acres of mapped native upland vegetation communities in the analysis area have been or will be affected by these existing and future trends and actions. Upland vegetation communities dominated by native species may persist in some of these areas, but native upland vegetation may no longer be present or may no longer dominate where disturbance is most intensive. Another 47,142 acres (56%) of the analysis area have experienced changes to native vegetation from wildfire, past vegetation treatments, and seeding projects, including approximately 45,724 acres (91%) of the mapped native upland vegetation communities in the analysis area. These areas may not currently support native upland vegetation communities but could be restored or naturally recover over time. Overall, these existing and future trends and actions have affected or will affect 77,628 acres (92%) of the analysis area and 46,296 acres (92%) of the mapped native upland vegetation communities in the analysis area.

3.15.1.2 Impacts

3.15.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and native upland vegetation communities would only be affected by existing and future trends and actions.

3.15.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

BLM (2005) identifies and discusses potential effects on upland vegetation during construction (2005:5-38–5-41), operation (2005:5-50–5-53), and decommissioning (2005:5-77) of a wind facility. Potential impacts described in BLM (2005) include direct injury or mortality, fugitive dust, exposure to contaminants, invasion by nonnative species, and increased wildfire risk. Impacts related to fugitive dust, exposure to contaminants, and invasion by nonnative species are analyzed in brief in EIS Appendix B (see AIB-59, AIB-45, and AIB-41, respectively). Effects related to increased wildfire risk are analyzed in detail in Section 3.7 (Fire and Fuels Management) of this EIS. Additional site-specific impacts related to direct injury and mortality are discussed in this section. See also Section 3.9.1.2 (Impacts to Grazing Allotments and Range Socioeconomics) for evaluation of affected allotment acres per action alternative.

Alternative B ground disturbance would remove or fragment native upland vegetation communities. Ground disturbance and vegetation removal would be minimized to the extent possible (applicant-committed measures 1, 4, and 109). A total of 5,473 acres of native upland vegetation would be removed or altered because of project ground disturbance (Table 3.15-3). Approximately 4,049 of those acres would be disturbed by work areas (during construction and decommissioning, and as needed during operation). Work areas would be revegetated after construction (applicant-committed measure 99) but would likely not fully reestablish to preconstruction conditions before re-disturbance during project decommissioning. (Grasses would reestablish after 3–5 years, but other vegetation would take longer to mature). Therefore, acres of work area ground disturbance could last for up to 39 to 41 years for grasslands and 84 to 86 years for sagebrush communities, which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus up to 5 years for grasslands and up to 50 years for sagebrush communities to reestablish after final reclamation. Approximately 1,424 acres of native upland vegetation communities would be lost to infrastructure for the life of the project until final reclamation is successful. Alternative B would disturb approximately 131 acres of very fragile soils in native upland vegetation communities (97 acres for work areas and 34 acres for infrastructure; see

Table 3.15-3). Very fragile soils naturally have relatively little vegetative cover, but these areas are unlikely to be successfully restored and would remain permanently disturbed following the project. Additionally, the BLM may choose to leave roads in place, and thus, impacts to native upland vegetation from access roads would be permanent.

MVE would be required to have a reclamation bond and would be held to BLM-approved reclamation success criteria for MVE's Reclamation Plan (Appendix E of MVE [2023]). The goal of reclamation would be to establish vegetation communities in disturbed areas that are comparable to the vegetation community in adjacent undisturbed areas. Postconstruction reclamation monitoring would be conducted by MVE and would include qualitative and quantitative (line-point intercept transects, etc.) assessments of the cover and diversity of vegetation present after reclamation. MVE has committed to up to 5 years of reclamation monitoring (applicant-committed measure 163). If desired cover and diversity thresholds (see Appendix E in MVE [2023] for details) have not been met after 5 years, MVE would coordinate with the BLM on possible adjustments to the criteria or the use of adaptive management procedures to address revegetation challenges and would continue monitoring until success criteria are met. However, BLM policy requires desired plant communities to be restored in all disturbed areas (required mitigation measure P). Use of irrigation (as necessary) and mulching would also be required to expedite interim reclamation in work areas (required mitigation measure Q).

With the implementation of these applicant-committed measures and measures required by BLM policy, most of the effects to native upland vegetation communities would be effectively minimized. However, these measures may not be sufficient to ensure successful interim reclamation in work areas.

Table 3.15-3. Summary of Impacts to Native Upland Vegetation Communities

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Ground disturbance in native upland vegetation	5,473 acres total 4,049 acres work areas 1,424 acres infrastructure	4,199 acres total 3,104 acres work areas 1,095 acres infrastructure	2,895 acres total 2,223 acres work areas 672 acres infrastructure	3,410 acres total 2,478 acres work areas 932 acres infrastructure	2,988 acres total 2,327 acres work areas 661 acres infrastructure
Ground disturbance in native upland vegetation and very fragile soils	131 acres total 97 acres work areas 34 acres infrastructure	106 acres total 78 acres work areas 28 acres infrastructure	77 acres total 59 acres work areas 18 acres infrastructure	88 acres total 64 acres work areas 24 acres infrastructure	45 acres total 35 acres work areas 10 acres infrastructure

Sources: NRCS (2020); USGS and DOA (2013).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for native upland vegetation communities are summarized in Table 3.15-4 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.15-4. Mitigation for Native Upland Vegetation Communities

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	P	a
4	Q	kk–ll
99	–	oo–pp
109	–	ooo–ppp
163	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to native upland vegetation communities by requiring minimization measures be taken as soon as possible and be applied throughout the life of the project and by expediting interim reclamation in work areas. MVE's Noxious Weed Management Plan (Appendix R of MVE [2023]) would be expanded to include control of other invasive plants (additional measure kk), and the Reclamation Plan (Appendix E of MVE [2023]) would be modified to include additional measures to restore sagebrush steppe habitat and flowering plants for pollinators (additional measure ll), which would further reduce impacts to native upland vegetation communities. The WEAP (additional measure pp) and annual reporting (additional measure oo) would help ensure that all required mitigation measures are implemented.

3.15.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B, though the magnitude of effects would likely be reduced. Alternative C would not include siting corridors in the southwest and northeast. However, much of the sighting corridors that would be removed are dominated by nonnative species, and the 4,199 acres of native upland vegetation communities that would be disturbed (see Table 3.15-3) would only represent a 23% reduction in impacts compared to Alternative B. Alternative C would disturb 106 acres of native upland vegetation in very fragile soils (see Table 3.15-3) that are unlikely to be successfully reclaimed, which is 18% less than Alternative B.

Alternative C would implement applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would effectively avoid or minimize impacts to native upland vegetation communities. Overall, Alternative C would result in fewer impacts to native upland vegetation communities than Alternative B but would result in greater impacts than Alternative D, Alternative E, and the Preferred Alternative.

3.15.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative B, though the magnitude of effects would likely be reduced. Alternative D would not only eliminate the same siting corridors as Alternative C, but would also eliminate most of the siting corridors east of Crestview Road to reduce development in areas that have higher sagebrush cover. This would reduce the impacts to intact native upland vegetation communities. Alternative D would alter or remove a total of 2,895 acres of native upland vegetation due to ground disturbance (see Table 3.15-2), which is approximately 47% less than Alternative B. Disturbance of native upland vegetation in very fragile soils (77 acres; see Table 3.15-3) would be the second-least of the action alternatives and would be reduced by 40% in comparison to Alternative B.

Under Alternative D, MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would effectively avoid or minimize impacts to native upland vegetation communities. Overall, Alternative D would result in fewer impacts to native upland vegetation communities than Alternatives B, C, and E, but slightly more impacts than the Preferred Alternative.

3.15.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to Alternative B, though the magnitude of effects would likely be reduced. Alternative E would eliminate the same siting corridors as Alternative C and limit the project's 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. Alternative E also would not include most of the siting corridors west of Crestview Road and south of the existing WEC, which would reduce development in areas that are mapped as native upland vegetation. Alternative E would alter or remove a total of 3,410 acres of native upland vegetation due to ground disturbance (see Table 3.15-3), which is approximately 38% less than Alternative B. Disturbance of native upland vegetation in very fragile soils (88 acres; see Table 3.15-3) would also be reduced by 32% in comparison to Alternative B.

Under Alternative E, MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would effectively minimize or avoid impacts to native upland vegetation communities. Overall, Alternative E would result in fewer impacts to native upland vegetation communities than Alternative B and C but greater impacts than Alternative D and the Preferred Alternative.

3.15.1.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to Alternative B, though the magnitude of effects would likely be reduced. The Preferred Alternative would have the smallest footprint of the action alternatives. The siting corridors eliminated under the Preferred Alternative would be similar to those eliminated under Alternative E; the Preferred Alternative would also limit the project's 500-kV transmission line to a single route that would follow the alignment of existing transmission lines. The Preferred Alternative would alter or remove a total of 2,988 acres of native upland vegetation due to ground disturbance (see Table 3.15-3), which is approximately 45% less than Alternative B. Disturbance of native upland vegetation in very fragile soils (45 acres; see Table 3.15-3) would also be reduced by 66% in comparison to Alternative B.

Under the Preferred Alternative, MVE would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would effectively minimize or avoid impacts to native upland vegetation communities. Overall, of the action alternatives, the Preferred Alternative would result in the least impacts to native upland vegetation communities.

3.15.1.2.7 CUMULATIVE IMPACTS

In the siting corridors, the project in combination with existing and future trends and actions described above and in Figure 3.15-2 would result in re-disturbance of previously disturbed areas. As described in Section 3.15.1.1.1 (Existing and Future Trends and Actions), approximately 36% of the analysis area, and 1% of the mapped native upland vegetation communities in the analysis area, have been or will be impacted by land use conversions, invasion by nonnative species, existing roads and ROWs, OHV use, and other proposed energy projects and may no longer provide functional habitat for native upland plant communities. An additional 56% of the analysis area, and 91% of the mapped native upland vegetation communities in the analysis area, have been subjected to wildfire, vegetation treatments, and seeding projects. These areas are likely to be dominated by grasslands (both native and nonnative). Livestock grazing and wildfires would continue to occur in the analysis area (see Section 3.7 [Fire and Fuels Management] and Section 3.9.1 [Grazing Allotments and Range Socioeconomics]), as would post-fire rehabilitation and other vegetation treatments.

Alternative B would disturb 11% of the mapped native upland vegetation communities in the analysis area, which would further fragment and degrade these vegetation communities. Some of this disturbance would overlap with areas that have been disturbed by the existing and future trends described above, where nonnative vegetation communities may already dominate.

The other action alternatives would disturb less of the mapped native upland vegetation communities in the analysis area, and thus, would have a smaller contribution to cumulative impacts. The proportion of the mapped native upland vegetation communities in the analysis area disturbed by these alternatives would be as follows:

- Alternative C: 8%
- Alternative D: 6%
- Alternative E: 7%
- Preferred Alternative: 6%

3.15.1.3 Significance Determination

Under all action alternatives with measures summarized in Table 3.15-4, the potential adverse long-term effects on native upland vegetation communities would not be significant. The disturbance resulting from each alternative would involve the removal or fragmentation of these communities. However, the implementation of avoidance and minimization measures is expected to mitigate these impacts by facilitating the re-establishment of these communities through interim and final reclamation efforts.

Specifically, disturbed work areas would undergo revegetation efforts aimed at restoring grasses and forbs within 3 to 5 years after the construction phase. It is important to note that these areas may be subject to additional disturbance throughout the life of the project. In areas where infrastructure is developed, the reclamation of upland native vegetation communities would be postponed until after decommissioning.

At the conclusion of the life of the project, MVE would be required to maintain a reclamation bond and adhere to BLM-approved reclamation success criteria. These criteria would define the thresholds for vegetation cover and diversity the BLM deems desirable. Any challenges encountered during the revegetation process in areas with particularly fragile soils would be addressed through continuous monitoring and adaptive management until the established success criteria are met.

3.15.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under all action alternatives, the project would have long-term irretrievable effects on native upland vegetation communities from work area ground disturbance and from project infrastructure. These effects could last until grasslands and sagebrush communities reestablish after final reclamation. These effects would not be irreversible because most of this disturbance would be reclaimed or restored. Irreversible effects would occur post-project in areas where very fragile soils are disturbed and reclamation potential is limited, where concrete foundations remain following decommissioning, and where the BLM may choose to leave roads in place, resulting in up to 1,127 acres of permanent native upland vegetation loss under Alternative B and 720 acres under the Preferred Alternative.

3.15.2 Bureau of Land Management Special-Status Plants

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.15-5.

Table 3.15-5. Analysis Approach for Bureau of Land Management Special-Status Plants

Issue Analyzed in Detail	Would the project result in population declines of BLM special-status plants?
Associated Issues Analyzed in Brief	Same as native upland vegetation communities (see Section 3.15.1).
Analysis Area	Same as native upland vegetation communities (see Section 3.15.1).
Indicators	Acres of ground disturbance.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus 5 years for successful vegetation reclamation, for a total of 39 to 41 years.
Data Sources	Occurrence data from the Idaho Species Diversity Database (IDFG 2020). The project vegetation assessment (WEST 2020) and special-status plant survey report (WEST 2021).

3.15.2.1 Affected Environment

Eleven BLM special-status plant species could occur in the analysis area (Table 3.15-3); this is based on a review of public data records, including IDFG (2020) and consultation with the BLM SFO botanist. As described in Section 3.15.1 (Native Upland Vegetation Communities), the analysis area is mostly composed of sagebrush steppe, with typical native vegetation including several species of sagebrush (*Artemisia* spp.), yellow and rubber rabbitbrush, and numerous perennial bunchgrass and forb species. However, several wildfires have occurred in and adjacent to the analysis area between 1980 and 2022 (years for which wildfire data are available), which, combined with livestock grazing, have resulted in alterations to native vegetation with the introduction of nonnative plants (BLM 2019). Five of the targeted special-status plant species occur in wetlands (Table 3.15-6). Numerous small wetland depressions are identified in the analysis area per the USFWS National Wetlands Inventory database (USFWS 2019), and several were observed during initial field surveys for the project.

There is one record from 2020 of a special-status plant species, Picabo milkvetch (*Astragalus oniciformis*), in the analysis area (IDFG 2020). This population, which occurs in a transmission line corridor, was most recently documented in 2011 with a minimum of three plants observed; though it was noted that the population could extend into potential habitat adjacent to the ROW that was not surveyed (Seabrook-Sturgis 2022). This site was visited during project special-status plant surveys, and although other *Astragalus* species were observed, no Picabo milkvetch were detected (WEST 2021).

Between 2016 and 2021, all 37 known populations of Picabo milkvetch on BLM public land were surveyed (Seabrook-Sturgis 2021). Compared to the last time they were surveyed (for most populations, this was in 1994), 19 populations (51%) had a negative trend; all but three of those populations declined in size by more than half (the other three populations had original estimates too rough to say exactly how steep the decline was). For four of those populations, no plants were found where hundreds had been found previously and may be extirpated. Four populations (11%) had a positive trend, seven (19%) were static, and seven (19%) had an unknown trend because the previous data were insufficient. Each of the unknown trends did have the same threats and degraded habitat as the negative-trending populations, however. In fact, there was not a single population that had good habitat quality not currently impacted and threatened by invasives. Picabo milkvetch is a narrowly distributed endemic species of north-central portion of the Eastern Snake River Plain (ESPA). The primary range for the species consists of a band of habitat approximately 13 miles wide and 42 miles long extending from Shoshone, Idaho to the northeast. The Picabo milkvetch population immediately to the north of the siting corridors is recognized as one of several disjunct satellite populations in the region (Moseley and Popovich 1995).

Table 3.15-6. Special-Status Plant Species with Potential to Occur in the Analysis Area

Common Name	Scientific Name	Typical Habitat
Mourning (or Fairfield) milkvetch	*Astragalus atratus* var. *inseptus*	Sagebrush steppe communities on flats and hillsides, often clayey, stony soil over basalt; bare ground in sagebrush
Picabo milkvetch	*Astragalus oniciformis*	Basins, bowls, flats with rolling topography having deep, stable, well-drained, sandy or sandy loam soils
Snake River milkvetch	*Astragalus purshii* var. *ophiogenes*	Often on barren sites growing in loosely aggregated, frequently moving sand and gravel deposits on bluffs, talus, dunes, and volcanic ash beds
Andrus' lomatium	*Lomatium andrusianum*	Heavy clay soils on flats and gradual slopes, often in big sagebrush. Tolerates disturbance and is commonly found in vegetation dominated by nonnative annual grasses.
Hot spring phacelia	*Phacelia thermalis*	Bare ground/openings in sagebrush; open clay flats
Booth's evening primrose	*Camissonia boothii* ssp. *Boothii*	Sandy flats; deep, loose slopes
Bacigalupi's downingia	*Downingia bacigalupii*	Vernal pools, grassy meadows
Dwarf rush	*Juncus hemiendytus* var. *abjectus*	Damp, open areas; especially vernally wet
Moss rush	*Juncus bryoides*	Wet places, washes, meadows, seeps
Slender woolly-heads	*Psilocarphus tenellus*	Dried beds of vernal pools and other open, moist or vernally moist places
Water-thread pondweed	*Potamogeton diversifolius*	Ponds, lakes, ditches, slow-moving water

Sources: BLM (2022c); Stevens et al. (2018); WEST (2021).

MVE conducted a desktop assessment of the siting corridors in 2020 to evaluate the potential for occurrence of special-status plant species in the analysis area (WEST 2020). Publicly available soil and vegetation data were reviewed to identify potential habitat for five of the six special-status upland plants with the potential to occur in the analysis area (see Table 3.15-6); Andrus' lomatium (*Lomatium andrusianum*) was not included in the habitat assessment because it was not added to the special-status plant list until 2022. These habitats were field verified and assessed for the potential to support special-status plant species by surveying 20 sample plots established within the potential habitats identified through desktop analysis. No special-status plant species were observed in the 20 sample plots during the July 2020 field verification survey, though the survey was not intended to identify individual occurrences of special-status plants. Two nonnative grasses, cheatgrass and crested wheatgrass, were the most common dominant species (10% cover or more) encountered, and cheatgrass cover was 50% or higher in 8 of the 20 sample plots. The most common native species were big sagebrush and Sandberg bluegrass. While the timing of the field survey may have resulted in fewer native forbs being detected, the results suggest that disturbance, fire, and the spread of nonnative plants have led to changes in vegetation composition and degraded the condition of potential habitat for special-status upland plants in the analysis area. However, special-status plants could occur in microhabitats in the siting corridors, and disturbed habitats in the siting corridors may remain suitable for special-status plants, which has been observed growing in these conditions, although sometimes with low vigor (Seabrook-Sturgis 2022; Stevens et al. 2018).

Special-status plant surveys were conducted in 2021 to further understand the extent of suitable habitat and the potential for special-status plants to occur in upland habitat the analysis area. This entailed two rounds of surveys during different time frames to encompass the flowering and/or fruiting period for all targeted special-status plant species. A total of 33 transects (1.5 miles long by 200 feet wide) were surveyed. The project layout was revised in June 2021, subsequent to the initiation of the special-status plant survey, and as a result, 10 of the survey transects are outside the current siting corridors and 3 transects are only partially within the current siting corridors. However, the transects located outside the current siting corridors are expected to be representative of vegetation conditions in the siting corridors because they are located in similar habitat types (herbaceous and shrub/scrub) (WEST 2021).

No BLM special-status plant species were recorded in the siting corridors during the 2021 surveys. One BLM special-status plant species, Picabo milkvetch, was observed along two survey transects north of the siting corridors (Figure 3.15-3) (WEST 2021). This consisted of four subpopulations of Picabo milkvetch, totaling approximately 869 individual plants, in sandy soils and habitat dominated by big sagebrush with at least 50% bare ground. Similar habitat that may be suitable for Picabo milkvetch was recorded in 11 other survey transects, 9 of which fall within the current siting corridor (see Figure 3.15-3), but no individuals were observed in these transects (WEST 2021).

Although not detected during the 2021 surveys, suitable habitat for other targeted upland species, including mourning milkvetch, Booth's evening primrose, and hot spring phacelia may be present within the siting corridors, and the full extent of potential habitat for these species has not been determined. The unusually dry conditions immediately preceding the 2021 surveys could have contributed to the lack of BLM special-status plant observations, and site-specific surveys may be necessary prior to ground disturbance to confirm the absence of these species (WEST 2021). Andrus' lomatium was added to the BLM special-status plant list in 2022 and was not included in the surveys, but suitable habitat is present and preconstruction clearance surveys would be necessary to determine whether the species is present. Numerous playas, wetlands, and seasonably wet habitats occur throughout the siting corridors, which could provide potential habitat for several of the wetland special-status plant species, including Bacigalupi's downingia, dwarf rush, and slender woolly-heads. A third round of surveys in 2021 targeted a subset of these playas and wet areas, but no special-status plant species were detected, though water was not present in these features at the time of survey.

There are approximately 3,814 acres of very fragile soils in the analysis area; these soils are typically characterized by very low vegetative cover but may still provide suitable habitat for some of the BLM special-status plant species in Table 3.15-6 (e.g., Booth's evening primrose, which grows on loose, sandy slopes). Very fragile soils are highly susceptible to erosion and degradation when disturbed (NRCS 2022) and are unlikely to be successfully reclaimed.

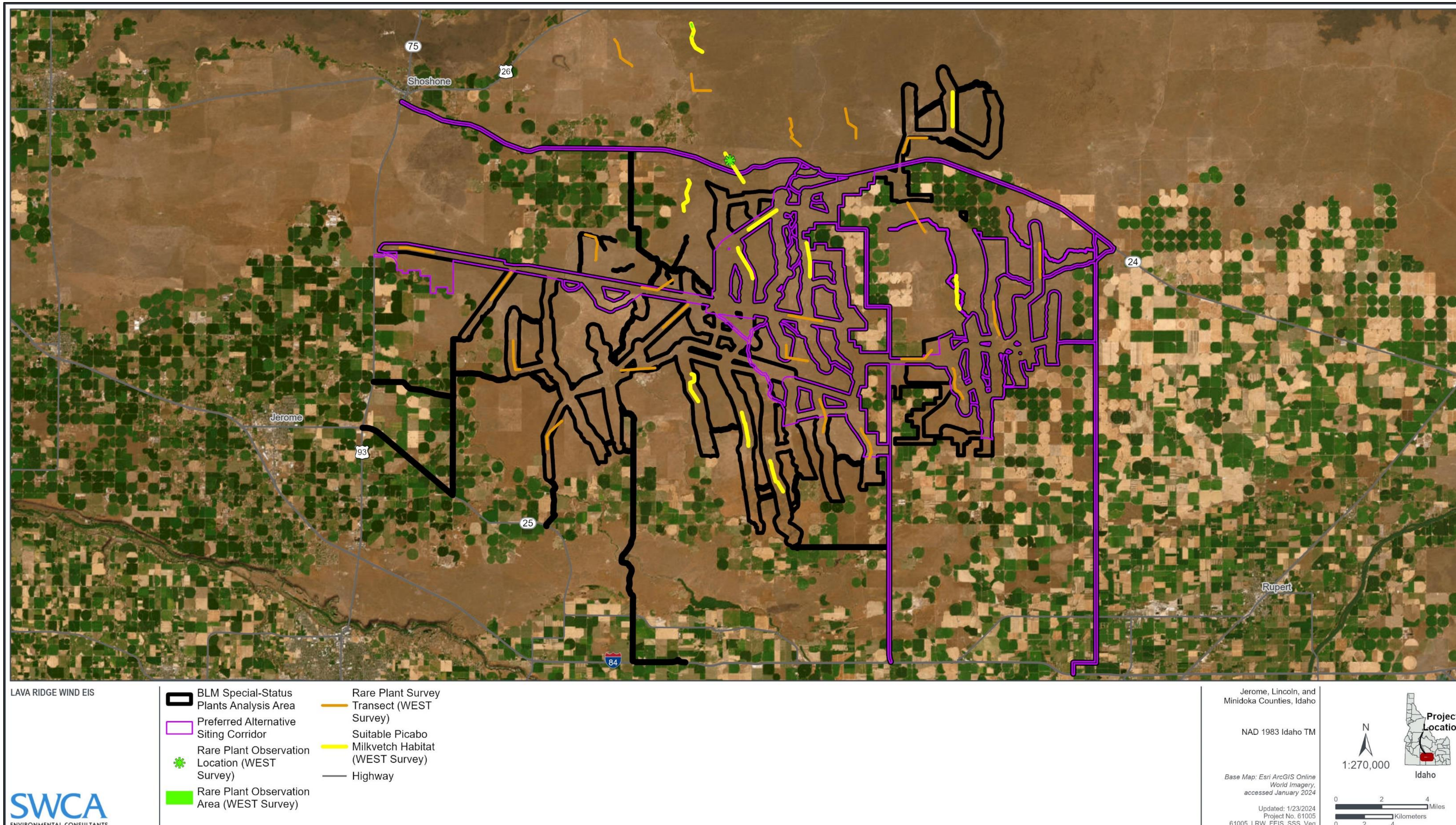

Figure 3.15-3. Special-status plant species survey results.

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3.15.2.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Wildfire, nonnative species, energy and transportation infrastructure, ROWs, conversion of open space (to agricultural, urban, or residential land), and other existing and future trends and actions have and will continue to influence native upland vegetation–dominated communities in the analysis area through degradation, fragmentation, and loss of habitat. Approximately 30,486 acres (36%) of the analysis area are dominated by nonnative plant species, are agriculture or rural residential, are disturbed (contain roads and other development), are proposed for other renewable energy development, or are existing ROWs (which may be subject to ongoing and future surface and vegetation-disturbing activities and pesticide application for vegetation management) (see Figure 3.11-2). High-quality habitat for BLM special-status plants is unlikely to be present in these areas; however, BLM special-status plant species could persist in some of these areas, and disturbed habitats may still be suitable for most BLM special-status plant species with the potential to occur in the siting corridor (Seabrook-Sturgis 2022).

Another 47,142 acres (56%) of the analysis have been affected by wildfire, past vegetation treatments, and seeding projects. Native perennial grasses have been seeded in some areas, but many past seeding efforts included nonnative crested wheatgrass because of its ability to establish readily in a difficult environment, provide deep-rooted structure, and compete against invasive annual grasses (such as cheatgrass). In general, these seeded areas are more likely to be dominated by perennial grasslands and may not provide the necessary habitat conditions for most BLM special-status plant species but could be restored or recover naturally over time.

Overall, these existing and future trends and actions have impacted or will impact 77,628 acres (92%) of the analysis area. Vegetation conditions will continue to change throughout the analysis area over the up to 41-year analysis duration, and native vegetation may recover in areas that have been disturbed.

The existing and future trend of climate change (see EIS Section 3.1.1 [Existing and Future Trends and Actions]), is also associated with the recent downward trend of Picabo milkvetch. As the climate changes, the increased frequency of wildfire occurrence and severity, as well as increased drought and warming, will likely continue this species' population decline and possibly increase the risk of decline for other special-status plant species in the area.

3.15.2.2 Impacts

3.15.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and special-status plant species would not be affected beyond the trends and actions described above.

3.15.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Project ground disturbance could impact BLM special-status plants in the analysis area through direct mortality and habitat loss and fragmentation. Indirect effects from project dust and increases in the potential for invasive species vectors, introduction, and spread are described in EIS Appendix 3 (AIB-41 and AIB-59). Effects to habitat are described above in Section 3.15.1.2 (Native Upland Vegetation Communities, Impacts). Therefore, this section focuses on direct effects to BLM special-status plants.

Though Picabo milkvetch has not been detected in the siting corridors, it is present immediately north of the siting corridors, and suitable habitat for the species is broadly distributed throughout the siting corridors. Thus, it is possible there are populations of Picabo milkvetch in areas not yet surveyed that could be impacted by the project. Additional impacts from the project to Picabo milkvetch could contribute to the range-wide trend of population decline for this species endemic to the SFO. However, in areas of potential habitat that have not yet been surveyed for the presence of special-status plants, MVE has committed to preconstruction clearance surveys using species-specific protocols agreed upon by the BLM (applicant-committed measure 110, Table App4-2b in EIS Appendix 4). If construction occurs outside the detection window for Picabo milkvetch or other special-status plants that could be present, MVE would consult with the BLM to determine whether a habitat assessment or other survey methods may be applicable alternatives to presence/absence surveys. MVE has also committed to using signs, flagging, or fencing to delineate and protect sensitive resources near construction activities (applicant-committed measure 14), which would ensure avoidance where these resources are identified. If MVE determines avoidance is not feasible, construction would be allowed to proceed with approval from the Authorized Officer, and MVE would consider relocation of plants per the direction of the BLM (applicant-committed measure 109).

The primary range for the Picabo milkvetch is located well north of the siting corridors and there is a low chance that there are large populations of the species in the siting corridors that have gone undetected. However, the species has declined precipitously across much of its limited range in the last 5 years and satellite populations such as the one immediately north of the siting corridors may play an increasingly important role in maintaining the species as whole. Although applicant-committed measures implemented under Alternative B would greatly reduce the potential for impacts to Picabo milkvetch, Alternative B would involve more ground disturbance than the other action alternatives (Table 3.15-7), and thus, has the greatest potential to impact Picabo milkvetch and its habitat.

Table 3.15-7. Summary of Impacts to Bureau of Land Management Special-Status Plant Species

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres ground disturbance	6,740 acres work areas 2,374 acres infrastructure	5,142 acres work areas 1,811 acres infrastructure	3,714 acres work areas 1,124 acres infrastructure	3,734 acres work areas 1,402 acres infrastructure	3,500 acres work areas 992 acres infrastructure
Ground disturbance in very fragile soils	413 acres total 306 acres work areas 108 acres infrastructure	312 acres total 231 acres work areas 81 acres infrastructure	257 acres total 197 acres work areas 60 acres infrastructure	236 acres total 172 acres work areas 64 acres infrastructure	145 acres total 113 acres work areas 32 acres infrastructure

Source: NRCS (2020).

Impacts to most of the other BLM special-status plant species listed in Table 3.15-6 are less likely due to a lack of known populations and suitable habitat. However, project baseline surveys for BLM special-status plants and their habitat covered a very small portion of the siting corridors, and the possibility that there are undetected populations of BLM special-status plants in the siting corridors remains. This is particularly true for *Astragalus* species, Andrus' lomatium, hot spring phacelia, Bacigalupi's downingia, water-thread pondweed, and slender woolly-heads; these species are more likely to occur in the disturbed habitats in the siting corridors than other special-status plants. The applicant-committed measures described above would provide an opportunity to identify previously undetected populations of BLM special-status plants and modify the project design to avoid these populations. Several of MVE's applicant-committed measures (Tables App4-2 in EIS Appendix 4) would limit or avoid disturbance in and near wetlands, which would reduce the potential for effects to BLM special-status plants that occur in wetland habitats (see Table 3.15-6). However, MVE has not committed to complete avoidance, and impacts to BLM special-status plants could still occur. Even if populations of BLM special-status plants could be completely avoided, Alternative B would include more ground disturbance than the other action alternatives (see Table 3.15-7), and thus, would be expected to have the greatest impact on any remaining habitat for BLM special-status in the siting corridors.

Reclamation would be designed to establish native vegetation communities in disturbed areas that are similar to adjacent undisturbed native vegetation communities at the time of decommissioning. This would minimize the project's long-term impacts on native upland vegetation in the analysis area but may not be as effective at minimizing impacts to BLM special-status plants and their habitat since these species can have more specific habitat requirements than other native plants. It is possible that the BLM would choose to leave access roads in place; therefore, if BLM special-status plant habitat cannot be avoided during road construction, the effects of those roads on habitat for special-status plants would persist for the life of the road. Approximately 550 acres would be permanently impacted by concrete foundations that would remain following decommissioning. Because of the limited potential for successful reclamation of very fragile soils, approximately 414 acres of habitat in the analysis area would continue to be unsuitable for BLM special-status plants following decommissioning and reclamation.

Since MVE has not committed to complete avoidance of BLM special-status plants and because reclaimed areas would be unlikely to meet the narrow habitat requirements for some BLM special-status plant species, potential residual effects to this resource could occur under Alternative B and thus the need for compensatory mitigation would be considered.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for BLM special-status plants are summarized in Table 3.15-8 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.15-8. Mitigation for Bureau of Land Management Special-Status Plants

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
14	–	a
109–110	–	kkk

Note: All measures are detailed in EIS Appendix 4.

Effects to BLM special-status plants would be reduced by these measures because additional plant surveys would be completed in the siting corridors and the likelihood of avoidance of BLM special-status plants would increase. Additionally, if BLM special-status species cannot be avoided, the BLM would require MVE to offset these impacts.

3.15.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects to BLM special-status plants from Alternative C would be similar to Alternative B, though the magnitude of effects would likely be reduced. The impacts on special-status plants from project ground disturbance and activities would be reduced commensurate with the decrease in ground disturbance compared to Alternative B (see Table 3.15-7). Alternative C would reduce permanent impacts to potential habitat for BLM special-status plants because it would decrease disturbance in very fragile soils that are unlikely to be successfully reclaimed (see Table 3.15-7) and because impacts from concrete foundations (536 acres) would be reduced. Alternative C would implement the same applicant-committed measures and additional measures as Alternative B with Additional Measures. Overall, Alternative C would result in fewer impacts to BLM special-status plants than Alternative B but greater impacts than Alternative D, Alternative E, and the Preferred Alternative.

3.15.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects to BLM special-status plants from Alternative D would be similar to Alternative B, though the magnitude of effects would likely be reduced. The impacts on BLM special-status plants from project ground disturbance and activities would be the second-least of the action alternatives (see Table 3.15-7). Alternative D would result in less ground disturbance in very fragile soils that are unlikely to be successfully reclaimed than Alternatives B and C but more than Alternative E and the Preferred Alternative (see Table 3.15-7). Impacts from concrete foundations (441 acres) would be reduced in comparison to Alternative B. Alternative D would implement the same applicant-committed measures and additional measures as Alternative B with Additional Measures.

3.15.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects to BLM special-status plants from Alternative E would be similar to Alternative B, though the magnitude of effects would likely be reduced. The impacts on BLM special-status plants from project ground disturbance and activities would be slightly greater than Alternative D, including disturbance in very fragile soils (see Table 3.15-7) and permanent disturbance from concrete foundations (424 acres). Alternative E would implement the same applicant-committed measures and additional measures as Alternative B with Additional Measures.

3.15.2.2.6 PREFERRED ALTERNATIVE

The types and duration of effects to BLM special-status plants from the Preferred Alternative would be similar to Alternative B, though the magnitude of effects would likely be reduced. The impacts on BLM special-status plants from project ground disturbance and activities would be the least of the action alternatives, including disturbance in very fragile soils (see Table 3.15-7) and permanent disturbance from concrete foundations (371 acres). The Preferred Alternative would implement the same applicant-committed measures and additional measures as Alternative B with Additional Measures.

3.15.2.2.7 CUMULATIVE IMPACTS

As described above, approximately 92% of the analysis area has been or will be impacted by land use conversions (conversion of open space to agricultural, urban, or rural residential), energy and transportation infrastructure and ROWs, invasion by nonnative species, wildfire, vegetation treatments, seeding projects, and other existing and future trends and actions. Alternative B would disturb approximately 11% of the analysis area, which would further fragment and degrade the habitat in the analysis area. Some of this disturbance would overlap with areas that have been or will be disturbed by the existing and future trends described above, where BLM special-status plants and their habitat may longer be present. The project. in combination with future trends such as climate change, may exacerbate effects to Picabo milkvetch and other BLM special-status plants in the analysis area. Picabo milkvetch will continue to experience increasing effects from climate change, such as more frequent and intense wildfires, and the project would further fragment and degrade habitat, which would increase the likelihood that Picabo milkvetch will continue to decline.

The other action alternatives would disturb less of the analysis area, and thus, would have a smaller contribution to cumulative impacts on BLM special-status plants. The proportion of the analysis area disturbed by these alternatives would be as follows:

- Alternative C: 8%
- Alternative D: 6%
- Alternative E: 6%
- Preferred Alternative: 6%

3.15.2.3 Significance Determination

Under all action alternatives with measures summarized in Table 3.15-8, potential adverse long-term effects to BLM special-status plants would not be significant. There are no known special-status plants located in the siting corridors. Preconstruction surveys would be conducted to avoid special-status plants that may be located within infrastructure and work areas. If specific locations cannot be avoided, MVE would complete seed collection and banking from the impacted population followed by plant propagation and then planting in suitable reclaimed areas. These measures would ensure that direct mortality to special-status plant species does not lead to a trend toward listing under ESA.

All action alternatives would result in habitat loss or alteration throughout the life of the project and until vegetation is reestablished after final reclamation. Effects to habitat for BLM special-status plant species with broader habitats or that are tolerant of disturbance would not be significant because most of the habitat would be reclaimed and restored in the long term. Reclamation efforts may not initially restore the narrow habitat requirements and fragile soils. However, any challenges encountered during the revegetation process in these areas would be addressed through continuous monitoring and adaptive management until the established success criteria are met.

3.15.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Unless BLM special-status plants are identified and avoided, ground disturbance and habitat loss or alteration under all action alternatives has the potential to irretrievably impact BLM special-status plants. Direct mortality of BLM special-status plants would only occur during the life of the project, ceasing after decommissioning. Effects to habitat for BLM special-status plant species with broader habitats or that are tolerant of disturbance would not be irreversible because most of the habitat would be reclaimed and restored in the long term. Since reclamation may not restore the narrow habitat requirements of some BLM special-status plant species, effects to their habitat may be irreversible. Additional irreversible effects would occur in areas permanently unable to support BLM special-status plant species.

3.16 VISUAL RESOURCES

3.16.1 Landscape Character and Scenic Quality (see main EIS)

3.16.2 Night Skies (see main EIS)

3.16.3 Shadow Flicker

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.16-1.

Table 3.16-1. Analysis Approach for Shadow Flicker

Issue Analyzed in Detail	How would shadow flicker from the introduction of wind turbines impact sensitive receptors within 2 miles of the siting corridors? A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker.
Analysis Area	Residences within 2.0 miles of the siting corridors (Figures 3.16-1 and 3.16-2). Sensitive receptor locations included occupied or potentially occupied residences, main travel routes, and recreational areas. In addition to residences, seven schools near the analysis area (see Figures 3.16-1and 3.16-2) were evaluated in the shadow flicker analysis.
Indicators	Modeled annual hours of shadow flicker at residences in the analysis area.
Impacts Duration	The 30-year project operation, i.e., when the turbine blades are spinning.
Data Sources	Shadow flicker analysis prepared for the project (SWCA 2024).

3.16.3.1 Affected Environment

There are 104 residences in the analysis area (see Figures 3.16-1 and 3.16-2), with up to 11 of these residences potentially affected by flicker (Table 3.16-2). Each of the residences within 2.0 miles of the siting corridors is identified by a receptor identification (ID) (Table 3.16-2). Residences in the analysis area and the schools near the analysis area do not currently experience shadow flicker, and there are no current analogs similar to the effects of shadow flicker.

3.16.3.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends for additional wind energy development in the SFO planning area (described in EIS Section 3.1 [Introduction and Methodology]) would not occur within the shadow flicker analysis area and therefore would not increase the amount of shadow flicker to the areas evaluated in this EIS.

3.16.3.2 Impacts

The extent of shadow flicker depends on the time of year and day (which determine the sun's angle above the ground) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker does not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating. Shadow flicker *intensity* is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 6,562 feet (1.24 miles) is very low and generally considered imperceptible. In general, shadow flicker becomes more noticeable as one gets closer to turbines, with the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurring nearest the wind turbines.

3.16.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and there would be no project-related shadow flicker.

3.16.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

Of the 104 residence locations in the analysis area, 93 would not experience shadow flicker. At all but two residence locations, there would be less than 30 hours per year of shadow flicker for each potential turbine location (see Table 3.16-2), which is within the acceptable industry standard range for avoiding nuisance (see Appendix D in SWCA [2024]). This industry standard was developed from a German court case based on admissible shadow flicker at a neighbor's property (Danish Wind Industry Association 2003). Although there are no applicable state or federal regulations, this is a standard practice as part of impact analyses in the United States.

Using preliminary layouts for Alternative B, there would be 10 residences with the potential to experience shadow flicker under the minimum turbine height (545 feet) and eight residences under the maximum turbine height (740 feet) (see Figures 3.16-1 and 3.16-2). (The location of individual turbines has not yet been determined and would influence the amount of shadow flicker at individual residences.) This is approximately 10% and 8% of residences in the analysis area, respectively. Of these, one residence (NSA 115) could experience shadow flicker more than 30 hours per year under the minimum turbine height, and two residences (NSA 111 and NSA 115) could experience more than 30 hours per year under the maximum height. The other nine residences could experience between 30 and 1.1 hours of shadow flicker per year under the minimum turbine height, and six residences could experience between 17.45 hours and 2.57 hours per year under the maximum height. Tables 3.16-2 and 3.16-3 summarize the results of the shadow flicker analysis. The maximum turbine height is expected to have a longer duration of shadow flicker at receptor locations due to a larger height and rotor radius compared to the minimum turbine height. However, fewer residences would be impacted overall because there would be fewer turbines in the maximum turbine height. The proposed maximum turbine height with 349 turbines would have less shadow flicker than the proposed minimum turbine height with 400 turbines. Shadow flicker predominantly occurs in early mornings and late evenings, and in early to mid-fall and early to mid-spring in relation to the sunlight being low on the horizon. MVE's applicant-committed measure 25, which would follow industry standard setback distances (see Table App4-2 in EIS Appendix 4), would minimize, but not avoid, shadow flicker at residences in the analysis area.

Schools and the interpretive areas of the Minidoka NHS property would not experience any shadow flicker due to their distance from the siting corridors (see Alternative B in Figures 3.16-1 and 3.16-2). The nearest school is 7 miles northwest of the nearest proposed turbine, and the closest proposed turbine to Minidoka NHS could be located 1.7 miles away. However, the closest proposed turbine could be located 0.6 mile away from a currently undeveloped Minidoka NHS property and could result in shadow flicker at this property for up to 30 hours per year under both potential turbine sizes.

Table 3.16-2. Residences with Potential to Experience Shadow Flicker

Receptor ID (Residences)	Alternative B Minimum Turbine Height (hours per year)	Alternative C Minimum Turbine Height (hours per year)	Alternative D Minimum Turbine Height (hours per year)	Alternative E Minimum Turbine Height (hours per year)	Alternative B Maximum Turbine Height (hours per year)	Alternative C Maximum Turbine Height (hours per year)	Alternative D Maximum Turbine Height (hours per year)	Alternative E Maximum Turbine Height (hours per year)	Preferred Alternative 5-MW Turbine Height (hours per year)
NSA 72	1:57	No flicker	No flicker	No flicker	No flicker	No flicker	No flicker	No flicker	No flicker
NSA 81	6:00	No flicker	6:00	No flicker	6:26	No flicker	6:26	No flicker	No flicker
NSA 90	1:04	No flicker	1:04	No flicker	2:57	No flicker	2:57	No flicker	No flicker
NSA 95	4:11	4:11	4:11	No flicker	No flicker	No flicker	No flicker	No flicker	No flicker
NSA 96	11:02	11:02	11:02	No flicker	13:05	13:05	13:05	No flicker	No flicker
NSA 102	21:27	21:27	2:47	21:27	17:45	17:45	0:07	17:45	5:06
NSA 111	16:30	16:30	16:30	16:30	37:23	37:23	37:23	37:23	30:08
NSA 112	No flicker	No flicker	No flicker	No flicker	3:23	3:23	3:23	3:23	No flicker
NSA 113	1:11	1:11	1:11	1:11	No flicker	No flicker	No flicker	No flicker	2:53
NSA 115	52:10	52:10	52:10	52:10	54:36	54:36	54:36	54:36	No flicker
NSA 116	2:04	2:04	2:04	2:04	4:05	4:05	4:05	4:05	No flicker

Note: Minimum turbine height refers to the 3-MW (545-foot) turbines, and maximum turbine height refers to the 6-MW (740-foot) turbines. Shadow flicker for the Preferred Alternative was not calculated because of the similarity of turbine siting corridors in the Preferred Alternative compared to Alternative E. Impacts from the Preferred Alternative are anticipated to be less than the results shown in the Alternative E Maximum Turbine Height but more than Alternative E Minimum Turbine Height due to the proposed turbine height of 660 feet.

Table 3.16-3. Number of Residences with Potential to Experience Shadow Flicker

Metric	Alternative B Minimum Turbine Height	Alternative C Minimum Turbine Height	Alternative D Minimum Turbine Height	Alternative E Minimum Turbine Height	Alternative B Maximum Turbine Height	Alternative C Maximum Turbine Height	Alternative D Maximum Turbine Height	Alternative E Maximum Turbine Height	Preferred Alternative 5-MW Turbine Height (hours per year)
Number of residences	10	7	9	5	8	6	8	5	3
Maximum hours of flicker per year	52:10	52:10	52:10	52:10	54:36	54:36	54:36	54:36	30:08
Minimum hours of flicker per year	1:04	1:11	1:04	1:11	2:57	3:23	0:07	3:23	2:53

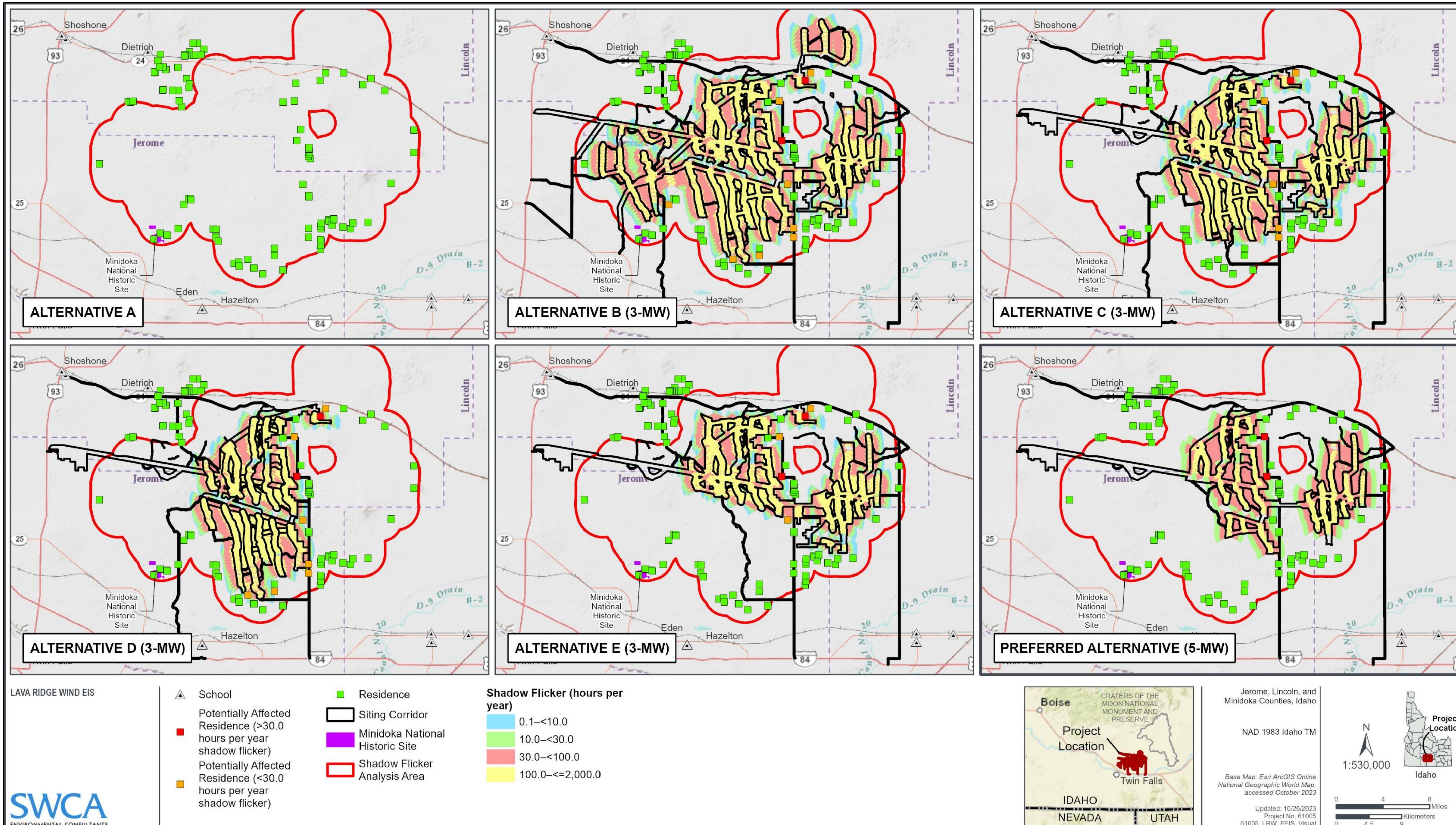

Figure 3.16-1. Shadow flicker analysis minimum turbine height (545 feet, 3 megawatts). Note: The Preferred Alternative proposes 5-megawatt turbines with a height of 660 feet.

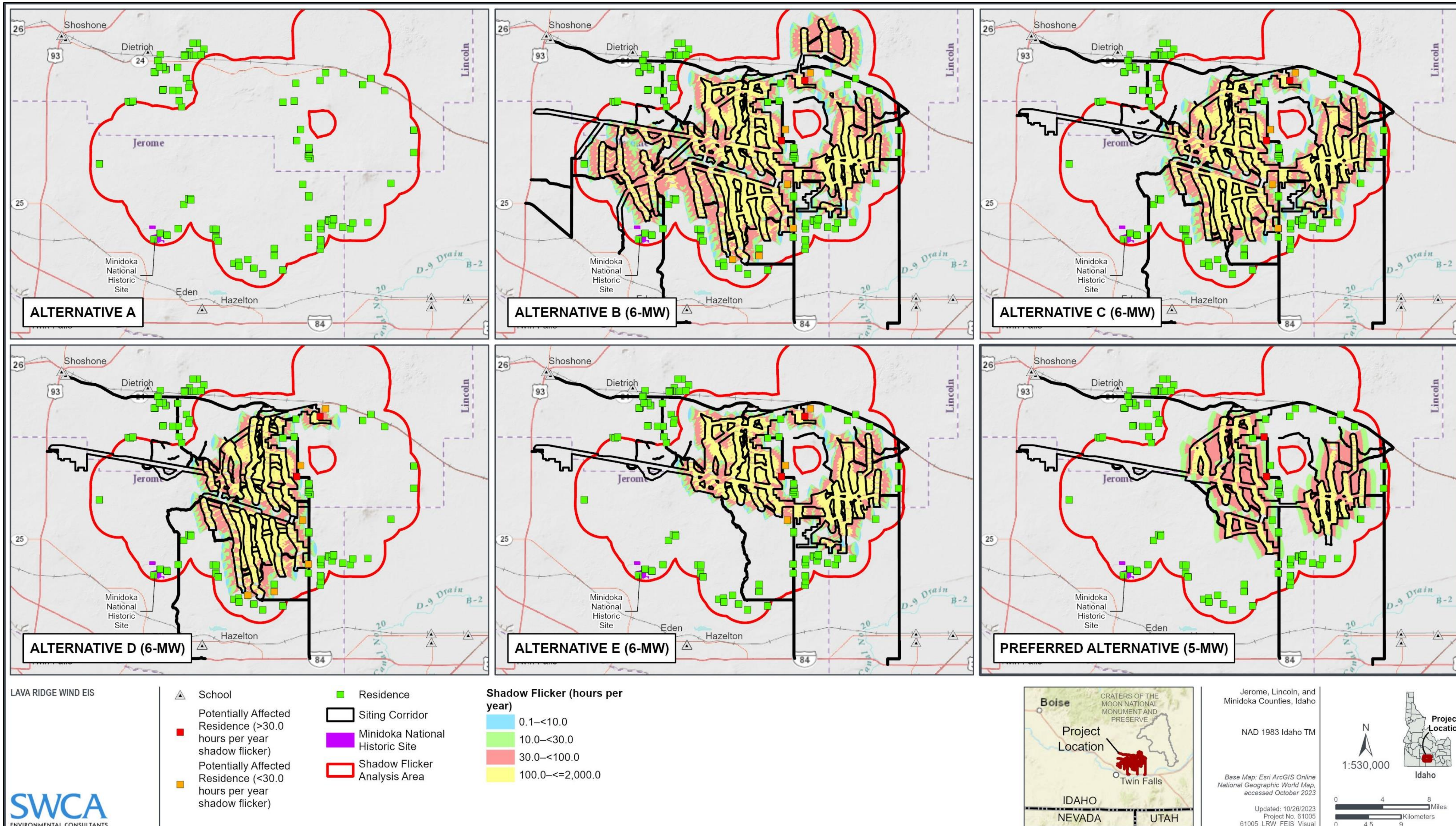

Figure 3.16-2. Shadow flicker analysis maximum turbine height (740 feet, 6 megawatts). Note: The Preferred Alternative proposes 5-megawatt turbines with a height of 660 feet.

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Alternative B with Additional Measures

In addition to applicant-committed measures and mitigation required by BLM policy (see Tables App4-2 and App4-3 in EIS Appendix 4) that would be implemented under Alternative B, the BLM would apply additional measures (see Table App 4-4 in EIS Appendix 4) to minimize impacts from shadow flicker under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for shadow flicker are summarized in Table 3.16-4 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.16-4. Mitigation for Shadow Flicker

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
25	–	ttt

Note: All measures are detailed in EIS Appendix 4.

With the addition of this measure, shadow flicker from Alternative B could be reduced to less than 30 hours per year at the two residences where shadow flicker could exceed 30 hours per year without this micrositing.

3.16.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would have shadow flicker effects similar to Alternative B, except there would be fewer residences with the potential to experience shadow flicker under both turbine heights (seven residences under the minimum turbine height and six residences under the maximum turbine height) (see Figures 3.16-1 and 3.16-2). This would be approximately 7% and 6% of residences in the analysis area, respectively. Similar to Alternative B with Additional Measures (measure ttt to provide a sufficient turbine siting setback), shadow flicker greater than 30 hours per year would be avoided at the one residence under the minimum turbine height and the two residences under the maximum turbine height. Tables 3.16-2 and 3.16-3 summarize the results of the shadow flicker analysis.

3.16.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would have shadow flicker effects similar to Alternative B, except there would be fewer residences with the potential to experience shadow flicker under both turbine heights (nine residences under the minimum turbine height and eight residences under the maximum turbine height) (see s 3.16-5 and 31.16-2). This would be approximately 9% and 8% of residences in the analysis area, respectively. Similar to Alternative B with Additional Measures (measure ttt to provide a sufficient turbine siting setback), shadow flicker greater than 30 hours per year would be avoided at the one residence under the minimum turbine height and the two residences under the maximum turbine height. Tables 3.16-2 and 3.16-3 summarize the results of the shadow flicker analysis.

3.16.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would have shadow flicker effects similar to Alternative C, except there would be fewer residences with the potential to experience shadow flicker under both turbine heights (five residences under both turbine heights) (see Figures 3.16-1 and 3.16-2). This would be approximately 5% of residences in the analysis area. Similar to Alternative B with Additional Measures (measure ttt to provide a sufficient turbine siting setback), shadow flicker greater than 30 hours per year would be avoided at the one residence under the minimum turbine height and the two residences under the maximum turbine height. Alternative E would have the fewest residences with the potential to experience shadow flicker of the action alternatives. Tables 3.16-2 and 3.16-3 summarize the results of the shadow flicker analysis.

3.16.3.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would have the fewest shadow flicker effects of all the alternatives. Only two residences could be affected more than 30 hours a year, and one residence could be affected less than 30 hours a year under the Preferred Alternative; see Figures 3.16-1 and 3.16-2. This would be less than approximately 3% of residences in the analysis area.

3.16.3.2.7 CUMULATIVE IMPACTS

There would be no cumulative shadow flicker impacts because the existing and future trends for additional wind energy development in the area managed by the SFO (described in EIS Section 3.1 [Introduction and Methodology]) would not occur in the shadow flicker analysis area.

3.16.3.3 Significance Determination

Under all action alternatives, potential adverse effects to sensitive receptors from shadow flicker would not be significant. With implementation of mitigation measures (Table 3.16-4), there would not be an adverse long-term effect from shadow flicker to sensitive receptors because turbines would be sited to reduce shadow flicker to less than 30 hours per year during the operation phase.

3.16.3.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Under Alternative B, there would be an irretrievable long-term effect from shadow flicker during the 30-year operation phase. This long-term effect would remain until turbines are removed from the landscape during decommissioning. Under all other action alternatives, this irretrievable long-term effect would not occur.

3.17 WATER AND WETLAND RESOURCES

3.17.1 Groundwater Quantity

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.17-1.

Table 3.17-1. Analysis Approach for Groundwater Quantity

Issue Analyzed in Detail	How would groundwater withdrawals needed for the project affect groundwater quantity in the analysis area?
Analysis Area	The ESPA (Figure 3.17-1). This analysis area was chosen because the project would withdraw water from the ESPA.
Indicators	Estimated project groundwater use. Potential decrease in water availability (volume) for water rights sourced from the same aquifer used by the project.
Impacts Duration	The life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives), which would be the duration of groundwater use.
Data Sources	MVE's hydrogeologic analysis (Idaho Water Engineering 2023), which includes historical groundwater volume data. USGS data on the ESPA (Lindholm 1996).

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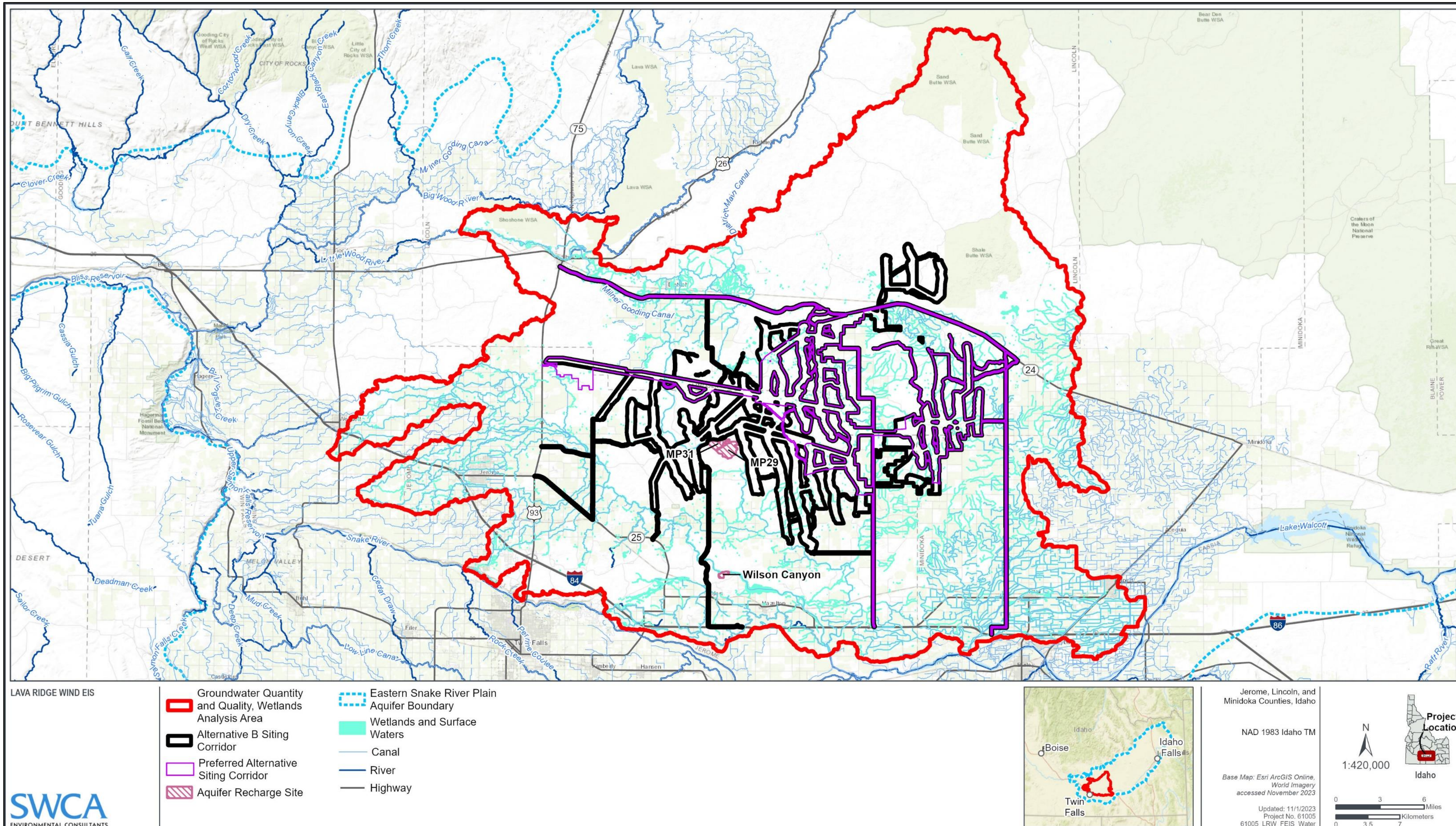

Figure 3.17-1. Analysis area for groundwater quality and quantity and wetland and surface water resources.

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3.17.1.1 Affected Environment

The ESPA covers approximately 10,800 square miles and stretches from approximately Twin Falls to Fremont, Idaho. The ESPA is characterized by thick basalt flows and a variety of volcanic landforms (Lindholm 1996). The ESPA is estimated to contain as much as 1 billion acre-feet of water (U.S. Nuclear Regulatory Commission [USNRC] 2006) (1 acre-foot of water is equal to 325,851 gallons of water, or the volume of water needed to cover 1 acre of land [about the size of a football field] with 1 foot of water). However, only approximately 100 to 200 million acre-feet are stored in the top few hundred feet of the ESPA. This top layer is where groundwater well withdrawal occurs.

Groundwater is stored in and moves through the ESPA along open spaces of fractured basalt flows, along rubble zones between the basalt flows, or through the void spaces between sediment particles. Though the total basalt thickness under the ESPA is estimated to be more than 5,000 feet, most of the lateral movement of groundwater occurs within the upper 300 to 500 feet (Idaho State University 2023). Groundwater primarily resides and moves through the rubbly and fractured margins of the top and bottom of the basalt flows.

The rate at which groundwater flows horizontally through an aquifer is known as *transmissivity*, a term used to describe an aquifer’s capacity to transmit water. Higher transmissivity corresponds to larger amounts of water moving across an area. Transmissivity values are modeled using groundwater well flow data. Transmissivity does not have a temporal variation but does have spatial variations based on geology and other factors. Transmissivity values within the ESPA range from 100,000 square feet per day to 36,800,000 square feet per day (Idaho Water Engineering 2023, available on the BLM project website (https://eplanning.blm.gov/eplanning-ui/project/2013782/510), which is extremely high. Transmissivity is an important factor in considering the effects of water withdrawal from an aquifer; typically, the higher the transmissivity, the more water may be withdrawn before effects occur to the aquifer. Layered basalt flows in the ESPA yield exceptionally large volumes of water to wells and springs (Skinner 2018). Individual well yields in the ESPA are some of the highest in the nation (Skinner 2018).

Agriculture is the largest consumptive user of water in the ESPA. There are roughly 2.1 million irrigated acres on the ESPA, which is approximately 60% of Idaho’s total (Idaho Water Resources Board 2009). Agriculture withdrawals account for approximately 95% of pumped groundwater, or approximately 1.14 million acre-feet (14% of the total water discharge from the aquifer) (USNRC 2006). Total aquifer discharge is approximately 8.22 million acre-feet of water. Most of the aquifer discharge (approximately 86%) occurs from spring flow and seepage flow to the Snake River (USNRC 2006).

Recharge of the ESPA occurs via multiple sources, including infiltration from irrigation, annual precipitation, and tributary basin underflow. Irrigation water infiltration provides the largest source of aquifer recharge, resulting in approximately 60% of total recharge to the ESPA (USNRC 2006). Surface water must be present for infiltration from surface water to groundwater to occur. Surface water is limited in and around the siting corridors and mainly occurs in the canals and seasonally in the aquifer recharge areas. Aquifer recharge areas are low-lying areas where rain melt and snow melt collect and subsequently soak (infiltrate) into the ground. Recharge areas include streams, rivers, ponds, lakebeds, ditches, and canals.

ESPA recharge is managed by the State of Idaho’s ESPA Recharge Program, which sets the expectations of recharge for the aquifer in collaboration with canal companies and irrigation districts. The program aims to add an average of 250,000 acre-feet per year to the aquifer by diverting and infiltrating surface water (Miller et al. 2020). From 2014 to 2019, the program achieved an average recharge of 249,028 acre-feet per year.

3.17.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence groundwater in the ESPA through withdrawals for agriculture (as described above) and commercial and residential use. Drilling and blasting are methods commonly used to obtain groundwater for these purposes. Blasting occurs weekly (if not daily) by licensed blasting contractors in Twin Falls, Jerome, Lincoln County, and Minidoka County, which are all over the ESPA. Population growth and energy development in the area are projected to grow (see EIS Section 3.1.1. [Existing and Future Trends and Actions]) and add water demands to the aquifer.

3.17.1.2 Impacts

3.17.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and groundwater quantity would only be affected by existing and future trends and actions.

3.17.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

During the 2-year construction phase, Alternative B would require approximately 160 million gallons of water (Table 3.17-2) for dust control, for batching water for concrete, and for washing needs (such as washing trucks and hydrating aggregate). This amount is equivalent to 491 acre-feet of water. Water may be withdrawn year-round throughout the 2-year construction phase.

The water required to support construction would not add to the cumulative use of water in the region. The project's water for construction would draw from previously permitted sources that are already allocated for use. MVE would lease water through the Water Supply Bank (operated by the Idaho Water Resource Board), acquire existing water rights, and/or purchase water from commercial sources. If water is leased or rights are acquired, new groundwater wells would be drilled (described in EIS Appendix 11 [Project Elements Common to All Action Alternatives] and in MVE [2023]). Up to six new groundwater wells are anticipated to support construction activities, four of which may remain active to support operation and maintenance. The new groundwater wells would be located in or near the proposed laydown yards and operation and maintenance facilities. Since the proportion of groundwater use to other commercial water sources is unknown, the analysis assumes that all water use for the project would be from groundwater. The actual quantity of project groundwater use could be less than the total project water needs.

Although construction would use approximately 83% of the total water required for the project (see Table 3.17-2), some water use would also be required during operation and decommissioning for washing of equipment, potable water sources for on-site personnel, ongoing road maintenance, dust control, reclamation vegetation management plans, and potential wildfire suppression activities. A minimal amount of continuous water use during operation and maintenance would be needed at the office and operation and maintenance buildings. The remaining water uses would withdraw water as needed, with some seasonal variation in water used for dust control. During the 2-year decommissioning and reclamation phase, water may be used continuously in low quantities for dust control and vegetation management.

The total acre-feet of water use for the project (approximately 589 acre-feet, or 191,750,000 gallons, spread over 34 years) would be equivalent to the annual volume of water needed to irrigate a 196-acre alfalfa field in the ESPA.

Table 3.17-2. Water Use by Action Alternative

Component or Metric	Alternative B	Alternative B with Additional Measures	Alternative C	Alternative D	Alternative E	Preferred Alternative
Water use	191,750,000 gallons total: 160,000,000 gallons construction 13,300,000 gallons operation and maintenance 18,450,000 gallons decommissioning	273,300,000 gallons total: 240,000,000 gallons construction 13,300,000 gallons operation and maintenance 20,000,000 gallons decommissioning	262,310,000 gallons total: 230,000,000 gallons construction 12,810,000 gallons operation and maintenance 19,500,000 gallons decommissioning	198,280,000 gallons total: 175,000,000 gallons construction 9,280,000 gallons operation and maintenance 14,000,000 gallons decommissioning	192,450,000 gallons total: 170,000,000 gallons construction 8,950,000 gallons operation and maintenance 13,500,000 gallons decommissioning	172,500,000 gallons total: 150,000,000 gallons construction 9,000,000 gallons operation and maintenance 13,500,000 gallons decommissioning
Water use	589 acre-feet total: 491 acre-feet construction 41 acre-feet operation and maintenance 57 acre-feet decommissioning	839 acre-feet total: 737 acre-feet construction 41 acre-feet operation and maintenance 61 acre-feet decommissioning	805 acre-feet total: 706 acre-feet construction 39 acre-feet operation and maintenance 60 acre-feet decommissioning	608 acre-feet total: 537 acre-feet construction 28 acre-feet operation and maintenance 43 acre-feet decommissioning	591 acre-feet total: 522 acre-feet construction 28 acre-feet operation and maintenance 41 acre-feet decommissioning	528 acre-feet total: 460 acre-feet construction 28 acre-feet operation and maintenance 40 acre-feet decommissioning
Idaho consumptive irrigation requirement for the project*	123 acres per year over 2-year construction period	123 acres per year over 3-year construction period	118 acres per year over 3-year construction period	90 acres per year over 3-year construction period	87 acres per year over 3-year construction period	77 acres per year over 3-year construction period
Groundwater wells	6 wells during construction; 4 to remain open during operation and decommissioning	6 wells during construction; 4 to remain open during operation and decommissioning	5 wells during construction; 4 to remain open during operation and decommissioning	4 wells during all project phases	4 wells during all project phases	4 wells during all project phases
Groundwater recharge	Near instantaneous due to high transmissivity and low rate of withdrawal	Near instantaneous due to high transmissivity and low rate of withdrawal	Near instantaneous due to high transmissivity and low rate of withdrawal	Near instantaneous due to high transmissivity and low rate of withdrawal	Near instantaneous due to high transmissivity and low rate of withdrawal	Near instantaneous due to high transmissivity and low rate of withdrawal
Potential decrease in water availability (volume) to the ESPA	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume	Drawdown of up to 0.04 feet (0.48 inch) < 0.001% of the total available aquifer volume

* The Idaho consumptive irrigation requirement (2 acre-feet per acre per year) for the project was calculated as total construction water use / (construction duration × 2 acre-feet per acre per year).

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MVE would use water from an existing water rights holder; that water rights holder would be required by the Idaho Department of Water Resources (IDWR) to pause irrigation on approximately 123 acres per year for 2 years during project construction, as calculated by the Idaho consumptive irrigation requirement, which is approximately 2 acre-feet per acre per year. The consumptive irrigation requirement is the quantity of irrigation water, exclusive of precipitation and stored soil moisture, that is required for consumptive use by an agricultural crop and all water lost to evaporation during the process of irrigation of an agricultural crop. Note that this consumptive use requirement applies only to the construction phase of the project and not to the total acre-feet of water needed for the life of the project, as described below. This water use is relatively small considering the IDWR ESPAM2 model shows that 218,823 acres are irrigated by groundwater from the ESPA in the three-county area (Jerome, Lincoln, and Minidoka Counties) surrounding the siting corridors (Vincent 2022). Total water consumption by the project would be less than 0.001% of the overall amount of water within the ESPA.

A hydrogeologic analysis for the project indicates that project groundwater use would drawdown existing groundwater wells close to the project wells 0.00 to 0.04 feet after 30 days of continuous pumping (Idaho Water Engineering 2023). (Although the exact location of the groundwater wells would be determined during final design, estimated project well locations would be 1,400 to 11,600 feet from existing groundwater wells.) This estimated pumping rate and drawdown represent the maximum water use at peak construction. Water use would not be at peak levels throughout the 2-year construction phase; most weeks would be less. Peak construction would occur between weeks 14 and 54, and groundwater use would be highest during that time; however, even during peak construction, use would vary between the highest rate modeled and lower rates. These small drawdowns would be attributed to the extremely high transmissivity values in the siting corridors and to the moderate pumping rate of 600 gallons per minute. The high transmissivity of the area indicates that groundwater recharge to pumped wells would occur nearly instantaneously. The project impacts to groundwater quantity would be measurable but would not be apparent to adjacent water users, including during the highest project groundwater use during construction. Since water use during other project phases would be lower (see Table 3.17-2), resulting potential drawdowns would also be lower. None of the project phases would impact aquifer recharge to the Snake River.

Since water use during operation would be substantially lower than during construction, the project would not be subject to the Amended Snake River Basin Moratorium Order (IDWR 2022) as an industrial use. Anticipated project water use during operation would be approximately 1,645 gallons per day, pumped from four wells at a rate of up to 15 gallons per minute (0.033 cubic feet per second). This would be below the thresholds of 2,500 gallons per day and 0.04 cubic feet per second set forth in IDWR (2022) and in Idaho Code 42-111 (1)(b). Idaho Code 42-111 (2) stipulates that water use from business establishments can qualify as domestic use if diversion rates and volumes are below thresholds set forth in subsection (1)(b). Therefore, the wells needed for project operation and maintenance would qualify as domestic and would not be subject to the moratorium (i.e., they would not need to be offset by pausing water use elsewhere).

Implementation of MVE’s applicant-committed measures to minimize ground vibrations or instability from blasting or excavating (measures 87, 88, and 91 through 94) (see Table App4-2 in EIS Appendix 4) would reduce potential impacts to wells, springs, and aquifers during construction. In addition, measure AA required by BLM policy would require monitoring of groundwater use, which would inform water-availability and potential adaptive management if needed.

Project blasting is also not expected to affect the transmissivity or quantity of water in the ESPA. Basalt is one of the densest types of rock (density ranges from 168.5 to 181 pounds per cubic foot [U.S. Bureau of Reclamation 2001]) and is not fragile. Basalt density ranges from 168.5 to 181 pounds per cubic foot (U.S. Bureau of Reclamation 2001). In general, denser rock requires more explosives to break it. Rock density is reduced by voids and zones of weakness, such as faults, joints, fissures, and alteration. A site-specific geotechnical evaluation of all project infrastructure locations that would require blasting would be completed before construction. This information in combination with MVE's final Blasting Plan would ensure that blasts are designed to have minimal impact to the surrounding rock outside the blast area. See Section 3.17.2 for analysis of impacts to groundwater wells and Section 3.17.3 for analysis of impacts to groundwater quality.

The project would avoid aquifer recharge areas (see Figure 3.17-1). An Alternative B access road would occur along the Milepost 31 recharge site's existing drivable dyke, but no project components or corridors would be located in the aquifer recharge area.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for groundwater quantity are summarized in Table 3.17-3 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.17-3. Mitigation for Groundwater Quantity

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
87–88	AA	xxx
91–94	–	–

Note: All measures are detailed in EIS Appendix 4.

This measure would further reduce impacts to groundwater quantity by ensuring that existing conditions are thoroughly understood before construction.

Also, although the quantity of water used during construction would not change from Alternative B, additional seasonal restrictions for wildlife would result in a 3-year construction period under Alternative B with Additional Measures. Therefore, the total amount of water used under Alternative B with Additional Measures would be greater (273,300,000 gallons, the greatest of the action alternatives; see Table 3.17-2). Also, the consumptive irrigation requirement would extend to 3 years and therefore would require pausing irrigation on approximately 123 acres per year for the 3 years of project construction.

3.17.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would require less total water use than Alternative B with Additional Measures and one fewer groundwater well (see Table 3.17-2). The total acre-feet of water use for the project (approximately 805 acre-feet, or 262,310,000 gallons, spread over 36 years) would be equivalent to the annual volume of water needed to irrigate a 268-acre alfalfa field in the ESPA.

Although Alternative C would require slightly less water use than Alternative B with Additional Measures, because the water use is so low compared to the amount of water available, the effects to water quantity in existing groundwater wells near the project (very small drawdowns) would be similar to but slightly fewer than Alternative B with Additional Measures. Also, all action alternatives would have the same rate of water withdrawal and the same consumptive irrigation requirement. The consumptive irrigation requirement for Alternative C would require pausing irrigation on approximately 118 acres per year for 3 years during project construction. Similar to all action alternatives, Alternative C's water for construction would draw from previously permitted sources that are already allocated for use; therefore, it would not add to the cumulative use of water in the region. None of the project phases would impact aquifer recharge to the Snake River.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to groundwater quantity.

3.17.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would require less total water use than Alternative B with Additional Measures and Alternative C and two fewer groundwater wells than Alternative B (see Table 3.17-2). The total acre-feet of water use for the project (approximately 608 acre-feet, or 198,280,000 gallons, spread over 36 years) would be equivalent to the annual volume of water needed to irrigate a 203-acre alfalfa field in the ESPA.

Although Alternative D would require less water use than Alternative B with Additional Measures, because the water use is so low compared to the amount of water available, the effects to water quantity in existing groundwater wells near the project (very small drawdowns) would be similar to Alternative B with Additional Measures. Also, all action alternatives would have the same rate of water withdrawal and the same consumptive irrigation requirement. The consumptive irrigation requirement for Alternative D would require pausing irrigation on approximately 90 acres per year for 3 years during project construction. Similar to all action alternatives, Alternative D's water for construction would draw from previously permitted sources that are already allocated for use; therefore, it would not add to the cumulative use of water in the region. None of the project phases would impact aquifer recharge to the Snake River.

Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to groundwater quantity.

3.17.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would require more groundwater use than Alternative B and the Preferred Alternative but less than Alternatives C, D, and B with Additional Measures. Alternative E would also have two fewer groundwater wells than Alternative B (see Table 3.17-2). The total acre-feet of water use for the project (approximately 591 acre-feet, or 192,450,000 gallons, spread over 36 years) would be equivalent to the annual volume of water needed to irrigate a 197-acre alfalfa field in the ESPA.

Although Alternative E would require less water use than three of the action alternatives, because the water use is so low compared to the amount of water available, the effects to water quantity in existing groundwater wells near the project (very small drawdowns) would be similar to Alternative B with Additional Measures. Also, all action alternatives would have the same rate of water withdrawal and the same consumptive irrigation requirement. The consumptive irrigation requirement for Alternative E would require pausing irrigation on approximately 87 acres per year for 3 years during project construction. Similar to all action alternatives, Alternative E's water for construction would draw from previously permitted sources that are already allocated for use; therefore, it would not add to the cumulative use of water in the region. None of the project phases would impact aquifer recharge to the Snake River.

Alternative E would implement the same applicant-committed measures and other mitigation measures as Alternative B with Additional Measures, which would similarly reduce potential impacts to groundwater quantity.

3.17.1.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would require the least total water use of the action alternatives (see Table 3.17-2). The total acre-feet of water use for the project (approximately 529 acre-feet, or 172,500,000 gallons, spread over 36 years) is equivalent to the annual volume of water needed to irrigate a 176-acre alfalfa field in the ESPA.

Since the water use would be so low compared to the amount of water available, the effects to water quantity in existing groundwater wells near the project (very small drawdowns) would be similar to Alternative B. Also, all action alternatives would have the same rate of water withdrawal and the same consumptive irrigation requirement. The consumptive irrigation requirement for the Preferred Alternative would require pausing irrigation on approximately 77 acres per year for 3 years during project construction. Similar to all action alternatives, the Preferred Alternative's water for construction would draw from previously permitted sources that are already allocated for use; therefore, it would not add to the cumulative use of water in the region. None of the project phases would impact aquifer recharge to the Snake River.

The Preferred Alternative would implement the same applicant-committed measures and other mitigation measures as Alternative B with Additional Measures, which would similarly reduce potential impacts to groundwater quantity.

3.17.1.2.7 CUMULATIVE IMPACTS

Project water use would not have cumulative impacts because it would draw from previously permitted sources that are already allocated for use. MVE would lease water through the Water Supply Bank, acquire existing water rights, or purchase water from commercial sources. Therefore, the project would not add to the cumulative use of water in the area.

3.17.1.3 Significance Determination

Under all action alternatives, potential adverse effects to groundwater quantity would not be significant. Over the life of the project, all action alternatives would require minor groundwater use. Minor reductions to groundwater quantity would be measurable but would not be apparent to adjacent water users, including during the highest project groundwater use during construction. None of the project phases would change aquifer recharge to the ESPA aquifer or the Snake River.

3.17.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

The project would not result in irreversible or irretrievable commitments of resources related to groundwater quantity. Groundwater use for the project would occur throughout the life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives. Minor reductions to groundwater quantity would be measurable but would not be apparent to adjacent water users, including during the highest project groundwater use during construction. The IDWR consumptive use requirement to pause irrigation on 77 to 123 acres (depending on the alternative) of agricultural water use annually during construction would further reduce the potential for irreversible or irretrievable commitments and short or long-term loss in productivity. Short-term uses of groundwater are not anticipated to adversely affect the long-term productivity of the ESPA aquifer or the Snake River due to the large volume of water stored in the aquifer.

3.17.2 Existing Groundwater Wells and Canals

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.17-4.

Table 3.17-4. Analysis Approach for Groundwater Wells and Canals

Issue Analyzed in Detail	How would the integrity of existing groundwater wells and the Milner-Gooding and Dietrich Main Canals be affected by project blasting? This section describes impacts to the physical integrity of groundwater wells and canals. Impacts to water quality in groundwater wells and canals is addressed in Section 3.17.3 (Groundwater Quality).
Associated Issues Analyzed in Brief	AIB-47: How would inadvertent spills or leaks from the storage or application of herbicides or the use or production of hazardous materials and wastes during construction and operation affect surface water or groundwater quality?
Analysis Area	The area within 1 mile of the siting corridors (see Figure 3.17-1).
Indicators	Qualitative description of the impacts of blasting and vibrations on existing wells and canals.
Impacts Duration	Long term to permanent.
Data Sources	Well data from IDWR (2023a). Consultations and personal communications with a hydrogeologist, geotechnical engineer, and professional blasters (Crownover 2023; DOWL 2024). MVE's hydrogeologic analysis (Idaho Water Engineering 2023), which includes historical groundwater volume data.

3.17.2.1 Affected Environment

There are 1,468 existing wells in the analysis area (IDWR 2023a). Well depths in the analysis area range from 15 to 703 feet, with the depth to first water ranging from 3 to 665 feet (IDWR 2023a), as summarized in Table 3.17-5. Records show that most of the wells are domestic and are constructed with 6-inch steel casing. Although data regarding the depth at which groundwater enters these wells (screen interval or well bottom) were not available, typically, wells are constructed so that groundwater enters the well at or near the bottom of the well. In general, the depth to water and consequent production zones of wells across the ESPA become deeper to the north. Shallower wells and shallower depths to water occur in areas that are close to surface water features, primarily canals and ditches. Figure 3.17-2 shows the locations of wells with depth to water at less than 100 feet.

Table 3.17-5. Groundwater Wells in the Analysis Area

Township (South): Range (East)	Number of Wells	Minimum Total Depth (feet)	Maximum Total Depth (feet)	Minimum Depth to Water (feet)	Maximum Depth to Water (feet)	Minimum Production (gallons per minute)	Maximum Production (gallons per minute)
5: 17 and 21	77	180	505	187	280	5	2,500
6: 17–22	385	90	700	19	588	1.5	2,800
7: 17–23	140	18	703	23	665	0	2,500
8: 17–23	542	85	937	80	665	0	3,000

Township (South): Range (East)	Number of Wells	Minimum Total Depth (feet)	Maximum Total Depth (feet)	Minimum Depth to Water (feet)	Maximum Depth to Water (feet)	Minimum Production (gallons per minute)	Maximum Production (gallons per minute)
9: 18–23	411	29	700	3	424	5	2,250
10: 19–23	275	15	607	4	396	3	330

Source: IDWR (2023a).

Note: Some entries in IDWR (2023a) are incomplete and may indicate total well depth, but not depth to water. Therefore, values shown for total depth in this table may be less than the depth to water because they may be from different entries.

The Milner-Gooding and Dietrich Main Canals cross the southwestern, northwestern, and northern portions of the analysis area (see Figure 3.17-2). The canals are open basalt irrigation canals lined with natural silt and sediment that seal most of the cracks. Cement or bentonite has been used historically on occasion by the canal companies as spot treatments to seal areas with excessive water loss.

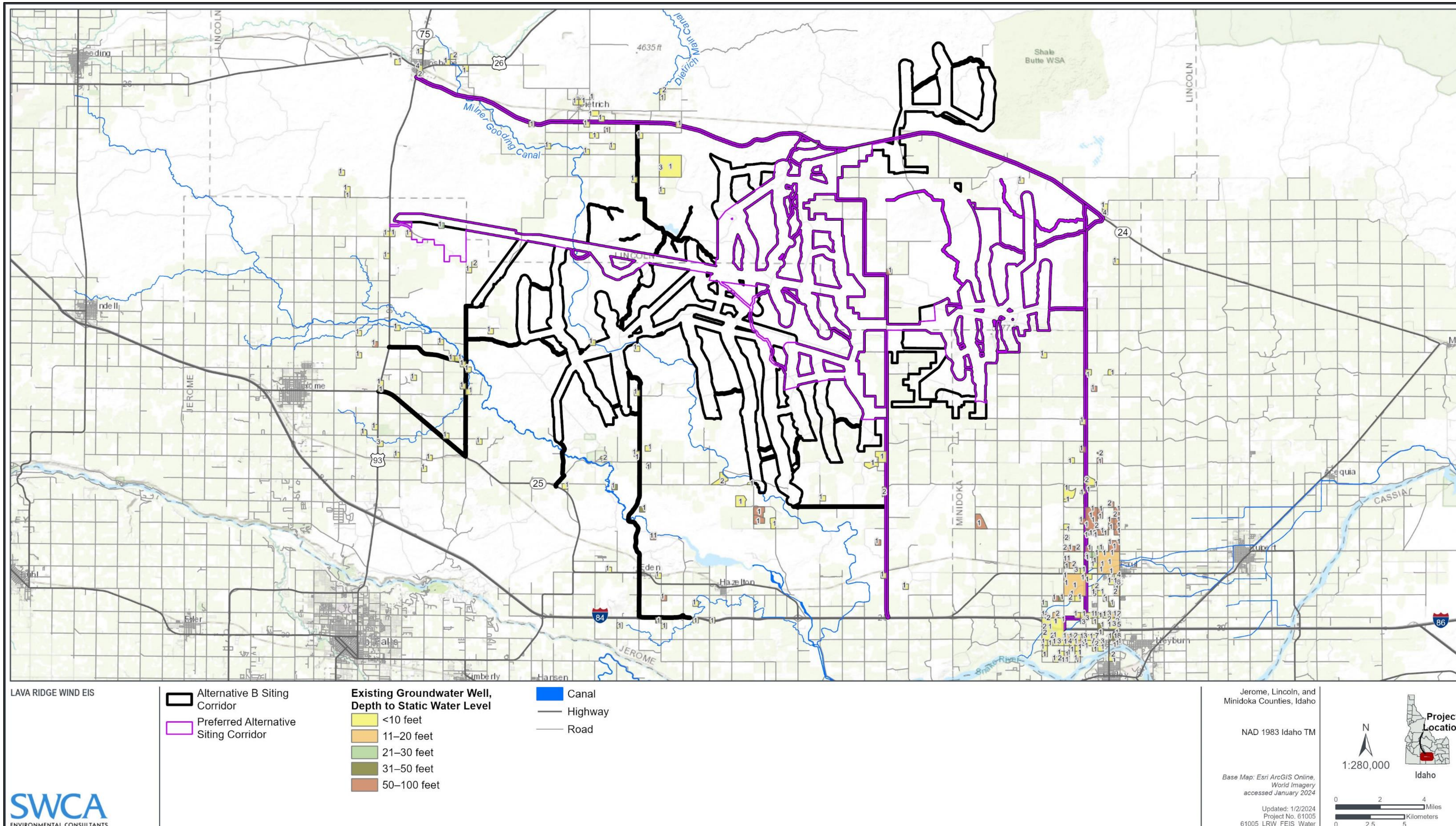

Figure 3.17-2. Groundwater wells in the analysis area with depth to water at less than 100 feet.

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3.17.2.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions are the same as those described for groundwater quantity.

3.17.2.2 Impacts

3.17.2.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and existing groundwater wells and canals would only be affected by existing and future trends and actions.

3.17.2.2.2 ALTERNATIVE B (PROPOSED ACTION)

Blasting occurs weekly (if not daily) by licensed blasting contractors in Twin Falls, Jerome, Lincoln County, and Minidoka County in support of transportation, transmission, and construction of other facilities. Although the exact locations of these blast sites are not detailed, due to the sheer number of existing wells in the area, it is likely that blasting occurs near existing wells regularly. Although neither IDWR nor Idaho Department of Lands has required blasting buffers or guidance, blasting is regulated at multiple levels and by several agencies. The regulatory responsibilities are typically split by industry type, i.e., construction, quarries, coal mining, demolition, and agriculture (International Society of Explosive Engineers 2019). In addition to government agencies, professional groups (e.g., International Society of Explosives Engineers) have set standards to guide the safe manufacturing, storage, transportation, and use of explosives. Blasting contractors must be fully licensed and insured for the transportation, use, and handling of explosives.

Before blasting, the blasting contractor typically prepares a blasting plan. The blasting plan establishes the appropriate safety protocols for the handling and use of explosives. See Appendix I in MVE [2023] for the Blasting Plan Methodology, which includes an outline for MVE’s forthcoming Blasting Plan.

The BLM consulted with geotechnical experts with almost 30 years of experience in blasting and experts in explosives and blasting that were not employed by MVE (Crownover 2023; DOWL 2024). The following is a summary of information from these experts in relation to typical blasting procedures and effects from blasting. Typically, blasting is allowed to occur near pipelines or wells as long as the blast holes are no deeper than one-half the distance to the pipelines or wells. This is the distance outside of the zone of deformation, or the conical crater left by the blast. Cratering has been studied extensively by the U.S. Bureau of Mines as well as by various military agencies. When an explosive charge is confined in the ground and detonated, the volume that is permanently deformed (cracked or moved) is ideally a conical solid with the base (point) end of the cone in the area at the bottom of the charge and the open end of the cone along the ground surface. The radius of the open end of the cone is approximately equal to the depth of the explosive. Outside of this conical volume, no permanent deformation occurs. Therefore, a pipeline or a well just outside this volume would sustain no damage from a blast.

Since basalt is one of the densest type of rock (U.S. Bureau of Reclamation 2001, as described in Section 3.17.1.2.2 [Alternative B]), project blasting is not expected to fracture or vibrate the rock to the extent of damaging the integrity of existing groundwater wells or canals outside the zone of deformation.

Most of the wells in the analysis area are constructed with a 6-inch steel casing (IDWR 2023a). Steel is the strongest material used for well casings, followed by stainless steel and polyvinyl chloride (PVC). The strength of these materials depends on if they were properly installed and their age. New materials are strongest. PVC and stainless steel degrade less over time than steel. Therefore, although steel is the strongest material, if it is old, thin, and rusty, it may be weaker than PVC. Although IDWR data may include well casing type, they do not provide details of how deep the casing extends into the ground, where groundwater enters the well (screen interval or well bottom), or other well construction information. Casings are now part of standard well construction, but it is possible domestic wells in the siting corridors do not have casing below 20 feet and that bentonite was not used to help protect the borehole from caving in.

Sealing the tops of wells is currently required by state law and typically consists of simultaneously feeding granular bentonite alongside the casing as it is lowered into the ground. Wells constructed in this manner are more resilient to rock movement from blasting or earthquakes. Although this is now required, older wells may not be sealed.

Most wells in and around the siting corridors are constructed in the deeper basalt aquifer (the ESPA) that has been repeatedly used for constructing good quality wells that produce high quantities of water (IDWR 2023a). The well data also indicate that there are some shallower wells (which may suggest a perched aquifer) that may be adversely affected by blasting (see Figure 3.17-2). Perched aquifers (i.e., aquifers that are shallower than the deep regional aquifer) may exist where dense layers of basalt that are not cracked (or fractured) interrupt the flow path of infiltrating water and create localized areas of ponded groundwater.

Most of the shallow wells occur in the southwestern part of the analysis area along the existing 600 West Road. Therefore, although blasting may be used to widen the road where needed, the depth of the blasting would not be as deep as for turbines or transmission lines. Blasting for turbine foundations would be between 10 and 14 feet (blasting would occur 2 feet lower than turbine foundation depth). Blasting for guyed structures for transmission lines would be between 27 and 57 feet deep. Based on the depth of groundwater documented in well logs (see Table 3.17-5), groundwater in some locations is as shallow as 3 feet and as deep as 665 feet. Therefore, blasting could encounter groundwater in some locations.

Although the Milner-Gooding and Dietrich Main Canals traverse the siting corridors, no turbines would be placed within 1,000 feet of irrigation canals (applicant-committed measure 138). The project would use existing roads to cross the canals and would not construct new roads across them.

MVE would prepare a blasting plan that would be approved by the BLM before construction (the outline of MVE's Blasting Plan is in Appendix I in MVE (2023). In addition, MVE would inspect wells both pre- and post-blast within 300 feet of a blast (applicant-committed measure 91). If it is determined by the post-blast inspection that the blast caused damage to the structure, MVE would repair the damage. MVE would use blasting seismographs to monitor blasting activities within 300 feet of a well and would ensure they do not exceed the threshold determined in the Blasting Plan (applicant-committed measures 85 and 93). Blasting seismographs may also be used on other blasts on an as-needed basis as determined by the licensed blasting contractor.

A qualified engineer would provide blast threshold criteria to the blasting contractor for blasts that would be potentially concerning for existing structures (applicant-committed measure 92). Blast criteria typically include a not-to-exceed peak particle velocity value and can vary based on the properties of the local environment of each blast (topography, geology, distance to structure, etc.) and the characteristics of each structure (e.g., the material of the structure). The licensed blasting contractor (applicant-committed measure 94) would ensure the design of the blast is in compliance with the blast criteria.

Implementation of MVE's applicant-committed measures to minimize ground vibrations or instability from blasting or excavating (measures 87, 90, and 123) (see EIS Table App4-2 in Appendix 4) would reduce potential impacts to wells during construction. In addition, measure AA required by BLM policy would require monitoring of groundwater use, which would inform water availability and potential adaptive management if needed.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for groundwater wells and canals are summarized in Table 3.17-6 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.17-6. Mitigation for Groundwater Wells and Canals

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
85	AA	xxx–bbbb
87	–	–
90–94	–	–
123	–	–
138	–	–

Note: All measures are detailed in EIS Appendix 4.

These measures would further reduce impacts to existing wells by requiring additional pre-blast inspections and reviews and implementing a larger blast avoidance area. With these measures in place, impacts to the integrity of existing groundwater wells and canals would be largely avoided. Table 3.17-7 summarizes the number of wells within 300 feet (distance of applicant-committed measure 91 for pre- and post-blast inspections) and 1,000 feet (distance of additional project-specific measure zzz and bbbb for pre- and post-blast inspections) of the siting corridors.

Table 3.17-7. Groundwater Wells and Canals within 300 feet or 1,000 feet of the Siting Corridors

Infrastructure	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Number of wells within 300 feet of siting corridors	61	52	20	48	46
Number of wells within 1,000 feet of siting corridors	72	54	21	49	53
Miles of canals within 300 feet of siting corridors	40	32	15	31	28
Miles of canals within 1,000 feet of siting corridors	52	42	19	40	36

Source: IDWR (2023a).

Note: Siting corridors include road and turbine corridors.

3.17.2.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would remove the turbine corridors that cross the Milner-Gooding Canal and several of the access road corridors that would cross the Dietrich Main Canal. An access road corridor would cross both of the canals using existing roads (see Table 3.17-7). Alternative C would also require less blasting than Alternative B because there would be fewer turbines; therefore, Alternative C would have less potential for impacts to existing groundwater wells and canals from blasting than Alternative B.

Alternative C would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to existing groundwater wells and canals would be largely avoided.

3.17.2.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would remove the same turbine and access road corridors that cross the Milner-Gooding and Dietrich Main Canals as Alternative C. An access road corridor would cross both of the canals using an existing road (see Table 3.17-7). Alternative D would require less blasting than Alternative B or C because there would be fewer turbines; therefore, Alternative D would have less potential for impacts from blasting than Alternative B or C.

Alternative D would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to existing groundwater wells and canals would be largely avoided.

3.17.2.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would remove the same turbine and access road corridors that cross the Milner-Gooding and Dietrich Main Canals as Alternative C and completely remove the access road corridor that would have crossed both canals (following South Eden Road). In addition, Alternative E would move the turbine corridors further away from the canals. An access road corridor would come near the Milner-Gooding Canal (following Cinder Butter Road) but would not cross it (see Table 3.17-7). Alternative E would require less blasting than Alternative B, C, or D because there would be fewer turbines; therefore, Alternative E would have less potential for impacts to existing groundwater wells and canals from blasting than Alternative B, C, or D.

Alternative E would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to existing groundwater wells and canals would be largely avoided.

3.17.2.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would require less blasting than any of the other action alternatives because there would be fewer turbines and fewer access road corridors. The turbine and access road corridors would be the furthest from the canals of all the action alternatives. Therefore, the Preferred Alternative would have the least potential for impacts to existing groundwater wells and canals from blasting of the action alternatives.

The Preferred Alternative would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to existing groundwater wells and canals would be largely avoided.

3.17.2.2.7 CUMULATIVE IMPACTS

With the implementation of applicant-committed measures and additional mitigation (see EIS Appendix 4), project effects to the physical integrity of groundwater wells and canals would be largely avoided; therefore, no cumulative effects are expected.

3.17.2.3 Significance Determination

Under all action alternatives, potential adverse short-term construction effects to groundwater wells and canals from project blasting and wind turbine foundation construction would not be significant. The implementation of project avoidance and minimization measures (see Table 3.17-6) would avoid impacts to groundwater wells and canals and no project effects are expected.

3.17.2.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

No irreversible or irretrievable effects are expected because with implementation of project avoidance and minimization measures (see Table 3.17-6), impacts to the integrity of existing groundwater wells and canals would be largely avoided, and no project effects are expected.

3.17.3 Groundwater Quality

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.17-8.

Table 3.17-8. Analysis Approach for Groundwater Quality

Issue Analyzed in Detail	Would groundwater be contaminated from project blasting and wind turbine generator foundation construction?
Associated Issues Analyzed in Brief	AIB-47: How would inadvertent spills or leaks from the storage or application of herbicides or the use or production of hazardous materials and wastes during construction and operation affect surface water or groundwater quality?
Analysis Area	Same as groundwater quantity, the ESPA (see Section 3.17.1 and Figure 3.17-1).
Indicators	General groundwater quality. Potential decrease in water quality due to project blasting.
Impacts Duration	Long term to permanent.
Data Sources	IDWR groundwater quality data (IDWR 2023b). USGS data on the ESPA (Lindholm 1996). USGS National Water-Quality Assessment (NAWQA) project data (Skinner 2018). Consultations and personal communications with a hydrogeologist, geotechnical engineer, and professional blasters (Crownover 2023; DOWL 2024).

3.17.3.1 Affected Environment

The ESPA is described in Section 3.17.1.1 (Affected Environment).

The USGS established a NAWQA project in the Jerome-Gooding County area due to a history of elevated nitrate concentrations in groundwater and because the area land uses are predominantly irrigated agriculture sourced by surface water (Skinner 2018). NAWQA projects are intended to provide nationally consistent information on water quality (surface and groundwater) and changes to it over time. Water quality data collected by USGS from 36 wells in the Jerome-Gooding County area of the ESPA indicate that groundwater water quality meets drinking water standards for many constituents tested (Skinner 2018); key constituents are summarized in Table 3.17-9, as described in Skinner (2018) and in the IDWR Environmental Data Management System database (IDWR 2023b), which provided data for eight wells in the siting corridors.

Table 3.17-9. Groundwater Quality in the Eastern Snake River Plain Aquifer

Water Quality Constituent	Concentrations from Skinner (2018)	Concentrations from IDWR (2023b)	Drinking Water Standard
Nitrate	< 0.04 to 9.93 mg/L 97% of wells had concentrations below 5.2 mg/L	< 1 to 7.5 mg/L	10 mg/L
Arsenic	1.75 to 21.24 µg/L Only 1 well was above 3.1 µg/L	Highest concentration 2.4 µg/L	10 µg/L
Cadmium	< 0.03 to 0.28 µg/L	< 1 µg/L	5 µg/L
Selenium	< 0.05 to 1.12 µg/L	Highest concentration 2.1 µg/L	50 µg/L
Orthophosphate	0.014 to 0.039 µg/L	Not reported	10 mg/L total phosphate
Pesticides	Not reported	2 out of 8 wells had low concentration detections of pesticides; the other 6 out of 8 wells had no detections. The pesticides detected were glyphosate and dichlorprop.	Varied

Sources: IDWR (2023b); Skinner (2018).
Notes: µg/L = micrograms per liter; mg/L = milligrams per liter.

3.17.3.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

The existing and future trends and actions are described in Section 3.17.1.1.1 (Existing and Future Trends and Actions). In addition, land use in the analysis area is largely agricultural, and sources of pesticides, nitrates, and other constituents described in Table 3.17-9 occur throughout the analysis area.

3.17.3.2 Impacts

3.17.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and groundwater quality would only be affected by existing and future trends and actions.

3.17.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

The BLM is aware that prior blasting near the Twin Falls Canal Company system resulted in breaks in the ground surface that created a potential pathway for surface water (and contaminants within it, namely *Escherichia coli* from adjacent livestock operations) to reach surrounding wells. In another case, naturally occurring sink holes near the Twin Falls Canal Company system created a potential pathway for surface water carrying *Escherichia coli* from adjacent livestock operations to reach the aquifer via a known aquifer recharge site and eventually reach surrounding wells.

As described above, the siting corridors are underlain by basalt. Cracks or fractures are pervasive in the basalt, although the frequency of fractures ranges from predictable to unpredictable. Highly fractured basalt may have closely spaced cracks within inches of each other. Other areas of the basalt may exhibit widely spaced fractures, up to hundreds of feet apart. Cracks in the basalt at the surface do not indicate there are cracks in the basalt at depth or indicate if cracks at the surface create pathways to the deep aquifer. Likewise, no cracks in the basalt at the surface do not indicate there are no cracks in the basalt at depth. Basalt conditions (cracked or not, spacing and connectivity) change laterally and vertically.

Surface water must be present for infiltration from surface to groundwater to occur. Surface water is limited in and around the siting corridors and mainly occurs in the canals and seasonally in the aquifer recharge areas.

Areas where the depth to groundwater is shallow or where there is a perched aquifer would have more risk of blasting encountering groundwater. As described in Section 3.17.2.1 (Affected Environment), the depth of groundwater documented in well logs (see Table 3.17-5) indicates that groundwater in some locations is as shallow as 3 feet and as deep as 665 feet. Shallower depths to water occur in areas that are close to surface water features, primarily canals and ditches. Blasting for turbine foundations would be between 10 and 14 feet (blasting would occur 2 feet lower than turbine foundation depth). Blasting for guyed structures for transmission lines would be between 27 and 57 feet deep. Therefore, blasting could encounter groundwater in some locations. Thus, a site-specific geotechnical evaluation of each turbine and infrastructure site would be completed before construction; this would help identify areas with shallow groundwater. MVE’s final Blasting Plan would be designed to accommodate the hydrogeologic conditions and existing wells or other underground infrastructure in the area.

The well data indicate that the depth to groundwater is shallowest in the southwestern part of the analysis area along the existing 600 West Road (see Figure 3.17-2). Therefore, although blasting may be used to widen the road where needed, the depth of the blasting would not be as deep as for turbines or transmission lines.

Shallow groundwater may also occur close to the Milner-Gooding and Dietrich Main Canals, which traverse the siting corridors. No turbines would be placed within 1,000 feet of irrigation canals (applicant-committed measure 138). The access road corridor crossings of the canals would be on existing roads. New roads would not be constructed across the canals.

The project would avoid aquifer recharge areas (see Figure 3.17-1), which may be pathways for contaminants entering the aquifer. An Alternative B access road would occur along the Milepost 31 recharge site's existing drivable dyke, but no project components or corridors would be located in the aquifer recharge area.

Blasting occurs over the ESPA on a weekly, if not daily, basis by licensed blasting contractors, as described in Section 3.17.1.1.1 (Existing and Future Trends and Actions). A site-specific geotechnical evaluation of each turbine and infrastructure site would be completed before construction. This information in combination with the final blasting plan would ensure that blasts are designed to have minimal impact to the surrounding rock outside the blast area. In addition, the project would be designed to avoid creating hydrologic conduits between two aquifers during foundation excavation and other activities (applicant-committed measure 126).

The project blasting plan would further minimize the possibility of creating potential pathways for surface water to reach surrounding wells or aquifer recharge sites. However, project blasting could encounter groundwater in areas where the depth to groundwater is shallow or where there is a perched aquifer, which could create a pathway for surface water to mix with groundwater.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for groundwater quality are summarized in Table 3.17-10 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.17-10. Mitigation for Groundwater Quality

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
85	–	xxx–bbbb
87	–	–
91	–	–
126	–	–
138	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would further reduce the possibility of impacts to groundwater quality by requiring additional pre-blast inspections and reviews and implementing a larger blast avoidance area. Measure aaaa would also require MVE to collect pre- and post-blast water quality samples for nitrate and bacteria (for wells that have a pre-blast inspection). With these measures in place, impacts to groundwater quality would be largely avoided or minimized. Table 3.17-7 summarizes the miles of canal within 1,000 feet (distance of additional project-specific measure zzz and bbbb for pre- and post-blast inspections) of the siting corridors.

3.17.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would remove the turbine corridors that cross the Milner-Gooding Canal and several of the access road corridors that would cross the Dietrich Main Canal. An access road corridor would cross both of the canals (see Table 3.17-7) using existing roads. Alternative C would also require less blasting than Alternative B because there would be fewer turbines; therefore, Alternative C would have less potential for impacts to groundwater quality from blasting than Alternative B.

Alternative C would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to groundwater quality would be largely avoided.

3.17.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would remove the same turbine and access road corridors that cross the Milner-Gooding and Dietrich Main Canals as Alternative C. An access road corridor would cross both of the canals using existing roads (see Table 3.17-7). Alternative D would require less blasting than Alternative B or C because there would be fewer turbines; therefore, Alternative D would have less potential for impacts to groundwater quality from blasting than Alternative B or C.

Alternative D would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to groundwater quality would be largely avoided.

3.17.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would remove the same turbine and access road corridors that cross the Milner-Gooding and Dietrich Main Canals as Alternative C and completely remove the access road corridor that crossed both canals (following South Eden Road). In addition, Alternative E would move the turbine corridors further away from the canals. An access road corridor would come near to the Milner-Gooding Canal (following Cinder Butter Road) but not cross it (see Table 3.17-7). Alternative E would require less blasting than Alternative B, C, or D because there would be fewer turbines; therefore, Alternative E would have less potential for impacts to groundwater quality from blasting than Alternative B, C, or D.

Alternative E would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to groundwater quality would be largely avoided.

3.17.3.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would require less blasting than any of the other action alternatives because there would be fewer turbines and fewer access road corridors. The turbine and access road corridors would be the furthest from the canals of all the action alternatives. Therefore, the Preferred Alternative would have the least potential for impacts to groundwater quality from blasting of the action alternatives.

The Preferred Alternative would implement the same additional project-specific measures as Alternative B with Additional Measures. Therefore, impacts to groundwater quality would be largely avoided.

3.17.3.2.7 CUMULATIVE IMPACTS

With the implementation of applicant-committed measures and additional mitigation (see EIS Appendix 4), project effects would be largely avoided; therefore, no cumulative effects are expected.

3.17.3.3 Significance Determination

Under all action alternatives, potential adverse short-term construction effects to groundwater quality from project blasting and wind turbine foundation construction would not be significant. The depth to the aquifer and the implementation of project avoidance and minimization measures (see Table 3.17-10) would avoid impacts to groundwater quality and no project effects are expected.

3.17.3.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

No irreversible or irretrievable effects are expected because with implementation of project avoidance and minimization measures (see Table 3.17-10), impacts to groundwater quality would be largely avoided or minimized, and no project effects are expected.

3.17.4 Wetlands and Surface Waters

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.17-11.

Table 3.17-11. Analysis Approach for Wetlands and Surface Waters

Issue Analyzed in Detail	How would project ground disturbance affect wetlands and surface waters (e.g., streams, canals, and ponds) in the analysis area?
Associated Issues Analyzed in Brief	AIB-47: How would inadvertent spills or leaks from the storage or application of herbicides or the use or production of hazardous materials and wastes during construction and operation affect surface water or groundwater quality? AIB-48: How would the project affect surface water quality through stormwater runoff or disruption of soils and sediments? AIB-49: Would the project lead to increased dust and thus potential for impacts to the surface water quality? AIB-50: How would the project impact floodplain function? AIB-51: Would the project impact surface water volumes due either to withdrawals or to an increase of non-permeable surfaces? AIB-52: How would project construction and operation affect riparian habitats?
Analysis Area	The watersheds that intersect project actions (see Figure 3.17-1 and Section 3.17.3.1). The USGS delineates watersheds in the United States by surface hydrologic features. A hydrologic unit code (HUC) is a system of organizing watersheds from region (largest unit, HUC-1) to subwatershed (smallest unit, HUC-12). The analysis area uses USGS HUC-12 subwatersheds. This analysis area was determined based on the connectedness of surface water resources at the watershed level.
Indicators	Acres and miles of ground disturbance in wetlands and surface waters.
Impacts Duration	The life of the project, i.e., the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives, plus 10 years for wetlands and surface waters to reestablish following final reclamation, for a total of 44 to 46 years.
Data Sources	USFWS National Wetland Inventory dataset (USFWS 2019). USGS National Hydrography Dataset (USGS 2018). MVE's aquatic resources inventory report (WEST 2021).
Assumptions	The analysis assumes that all wetlands and waters identified in this EIS are jurisdictional and therefore are waters of the United States per the Clean Water Act. MVE would complete site-specific wetland surveys once an alternative is selected and the final design is complete. Based on the U.S. Army Corps of Engineers' (USACE's) jurisdictional determination at that time, final acres of wetland impacts may be less than those described in this EIS because final project siting would avoid wetlands to the extent practicable (applicant-committed measures 124, 127, 129, 133, 136, and 138).

3.17.4.1 Affected Environment

The project would intersect 24 subwatersheds (HUC-12s) covering approximately 799,616 acres (Table 3.17-12). There are approximately 8,816 acres of wetlands and 1,709 miles of watercourses in the analysis area (USFWS 2019; USGS 2018). In the siting corridors, there are 551 acres of wetlands and 90 miles of watercourses (USFWS 2019; USGS 2018).

Table 3.17-12. Hydrologic Unit Code 12 Subwatersheds that Intersect the Project

HUC-12	Name	HUC Type	Acres
170402120104	170402120104	Standard	23,377
170402120105	170402120105	Standard	28,455
170402121002	170402121002	Standard	35,074
170402120102	26 Mile Lake	Closed basin	19,907
170402120501	Camp Two Lake	Standard	31,796
170402210902	City of Dietrich	Closed basin	57,154
170402121003	City of Jerome	Standard	30,909
170402210903	City of Shoshone-Little Wood River	Standard	25,909

HUC-12	Name	HUC Type	Acres
170402121001	Flat Top Butte	Standard	18,895
170402120106	Goose Lake	Standard	29,829
170402091204	Kimama Butte	Standard	20,527
170402091101	Monument Reservoir	Closed basin	155,090
170402091106	North Center Lake	Closed basin	22,129
170402120103	Russian Lake	Closed basin	28,802
170402091105	Sid Reservoir	Standard	13,539
170402120101	Star Lake	Standard	26,861
170402210901	Star Lake Ranch	Closed basin	19,761
170402091201	The Crater	Standard	21,733
170402091208	Town of Budge	Standard	23,382
170402120503	Town of Falls City-Snake River	Standard	23,115
170402091104	Town of Kimama	Closed basin	33,949
170402120108	Town of McHenry	Standard	45,954
170402091207	Town of Rupert	Standard	25,208
170402120107	Wilson Lake Reservoir	Standard	38,259
	Total		**799,616**

Note: As per Jones et al. (2022), a standard HUC type is a hydrologic unit with drainage flowing to a single outlet point, excluding noncontributing areas. A closed basin is a hydrologic unit with a drainage area that is 100% non-contributing. This means all surface flow is internal and no overland flow leaves the hydrologic unit through the outlet point.

3.17.4.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence wetlands and surface waters in the analysis area through ground disturbance, impervious surfaces, fill, flow alteration, introduction of invasive species, and conversion of open space to agriculture or rural residential. Approximately 716,870 acres (88%) of the analysis area are disturbed (containing roads, development, existing ROWs, energy infrastructure, or agriculture), are grazed by livestock, or have reclamation from previous disturbance.

3.17.4.2 Impacts

3.17.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would continue as described under the affected environment. The project would not be developed, and wetlands and surface waters would only be affected by existing and future trends and actions.

3.17.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

Project siting would avoid and minimize placement of project infrastructure in wetlands and drainages to the extent practicable (applicant-committed measures 123, 124, 127, 134, and 136). However, roads and electrical lines (which may be underground or overhead) would cross some drainages, and work areas may require siting within some wetlands or drainages. Per the NWI and NHD (USFWS 2019 and USGS 2018), there are approximately 551 acres of wetlands and 90 miles of watercourses (including canals) in the siting corridors. Project work area ground disturbance could occur in approximately 44 acres of wetland and approximately 11 miles of watercourse (Table 3.17-13).[12] Project infrastructure area ground disturbance could occur in approximately 15 acres of wetland and approximately 4 miles of watercourse (see Table 3.17-13). These estimates are based on the percentage of the siting corridors that would be disturbed and applied to the total acres of wetlands in the siting corridors. The actual number of wetlands and waters that would be disturbed would be less than these estimates because final siting would avoid wetlands to the extent practicable (applicant-committed measures 123, 124, 127, 134, and 136). The actual number would be determined for the project's Clean Water Act Section 404 permit once an alternative is selected and final wetland surveys are completed.

During operation, ground disturbance in wetlands and waters would occur as needed for maintenance in work areas; however, this ground disturbance would occur in areas previously disturbed during construction. These wetland and waters are the same wetlands and waters that would be identified in the USACE permit.

Decommissioning would have similar to lesser effects on wetlands or waters as construction, and ground disturbance would occur in areas previously disturbed during construction. Roads would be used to remove infrastructure and could be reclaimed as determined with the BLM. Underground collector lines would be abandoned in place, and the ground would not be re-disturbed.

Wetlands are not a common landcover on the desert landscape; they cover 1% of the analysis area. As described in Section 3.15.1.1 (Native Upland Vegetation Communities, Affected Environment), the valley and plain landscapes of the analysis area are dominated by sagebrush steppe but also include irrigated agriculture and development (McGrath et al. 2002). Wetlands are often rich in vegetation diversity and structure and play a vital role in semi-arid ecosystems by providing food, water, shade, and cover to wildlife and livestock, in addition to acting as water purifiers, supplying groundwater recharge, and aiding in flood control. Wetlands make up a small percentage of the lands in the West, but their importance to the surrounding ecosystems and associated species is disproportionately great.

Ground disturbance in wetlands would remove or alter wetlands, change their function, change the rate and quantity of runoff from the fill footprint, compact soils, and alter flow patterns. Following project decommissioning and successful reclamation (including recontouring and reconnecting hydrology as needed, applicant-committed measures 19 and BLM-required measure P), wetlands would return to be as close as possible to their natural state.

Ground disturbance in waters could locally change flow patterns; increase channel scour and bank erosion; and increase turbidity, total dissolved solids, and total suspended solids in the work area and immediately downstream.

Table 3.17-13. Ground Disturbance in Wetland and Waters by Action Alternative

Wetlands or Waters	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Work areas in wetlands	44 acres	37 acres	27 acres	30 acres	28 acres
Work areas in watercourses	11 miles	10 miles	5 miles	7 miles	4 miles
Infrastructure area in wetlands	15 acres	13 acres	8 acres	11 acres	8 acres

[12] As described in Section 2.3.2 (Work Area and Infrastructure Disturbance), work areas would receive interim reclamation before decommissioning.

Wetlands or Waters	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Infrastructure area in watercourses	4 miles	4 miles	2 mile	3 miles	1 mile

Note: Watercourses include canals.

MVE's applicant-committed measures to minimize work areas and infrastructure areas (measures 1, 3, and 4), to prevent the introduction or spread of weeds and nonnative species (measures 100 through 107) and to avoid and minimize stormwater runoff and erosion (measures 120 through 135) would reduce but not eliminate potential impacts to wetlands and waters (see Table App4-2 in EIS Appendix 4). These measures would reduce potential impacts to wetlands and waters by minimizing overall ground disturbance within them to the extent practicable, establishing best practices for working within or near wetlands and waters and ensuring disturbed areas are stabilized and reclaimed postconstruction, which minimizes potential erosion and sedimentation of waterbodies.

If avoidance of wetlands is not practicable, then MVE would prepare site-specific plans and measures (e.g., erosion and sediment control measures, culverts sized in accordance with USACE and BLM standards, etc.) to mitigate impacts. These plans would be incorporated into the POD and submitted for approval by BLM prior to issuance of a construction notice to proceed. Potential residual impacts that may occur due to non-avoidance may warrant compensatory mitigation, as described in Section 3.17.4.4 (Compensatory Mitigation).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit, if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for wetlands and surface waters are summarized in Table 3.17-14 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.17-14. Mitigation for Wetlands and Surface Waters

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	P	a
3–4	–	cc
19	–	uuu–www
100–107	–	–
120–136	–	–
138	–	–

Note: All measures are detailed in EIS Appendix 4.

These measures would increase the likelihood of wetland avoidance and further reduce impacts to wetlands and surface waters by minimizing impacts to drainage and runoff patterns, wetland habitat, and wetland soils. With the implementation of these additional measures, wetlands and surface waters would be almost entirely avoided; therefore, there would be relatively little impact to wetlands and surface waters in the analysis area. If avoidance of wetlands is not practicable, residual impacts that may occur due to non-avoidance, may warrant compensatory mitigation (see Section 3.17.4.4).

3.17.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

Alternative C would require less ground disturbance in wetlands and waters than Alternative B (see Table 3.17-12). The type and duration of effects under Alternative C would be similar to Alternative B with Additional Measures.

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to wetlands and waters.

3.17.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

Alternative D would require the least amount of ground disturbance in wetlands and waters of the action alternatives (see Table 3.17-12). The type and duration of effects under Alternative D would be similar to Alternative B with Additional Measures. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to wetlands and waters.

3.17.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

Alternative E would require the second-least amount of ground disturbance in wetlands and waters of the action alternatives (see Table 3.17-12). The type and duration of effects under Alternative E would be similar to Alternative B with Additional Measures. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to wetlands and waters.

3.17.4.2.6 PREFERRED ALTERNATIVE

The Preferred Alternative would require a similar amount of ground disturbance in wetlands as Alternative D and the least amount of ground disturbance in waters (see Table 3.17-12). The type and duration of effects under the Preferred Alternative would be similar to Alternative B with Additional Measures. The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, which would similarly reduce potential impacts to wetlands and waters.

3.17.4.2.7 CUMULATIVE IMPACTS

The project, in combination with existing and future trends and actions in the analysis area, could fill or alter wetlands. However, because few wetlands occur in the area and because developers would work to site projects to avoid wetlands and waters to the extent practicable, effects are not expected to be substantial.

3.17.4.3 Significance Determination

Under all action alternatives, potential adverse effects to wetlands and waters would not be significant. Although wetlands have been identified within the affected areas, with the implementation of the additional avoidance and minimization measures in Table 3.17-14, these areas would almost be entirely avoided, and if not avoided, site-specific measures would reduce impacts and maintain functioning wetlands.

3.17.4.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Over the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives), all action alternatives would have long-term irretrievable impacts on wetlands and surface waters where these features overlap work areas and infrastructure areas. Following project decommissioning and successful reclamation, wetlands and surface waters would return to be as close as possible to their natural state with the exception being those areas permanently affected being irreversibly lost.

3.17.4.5 Compensatory Mitigation

With the implementation of water-related applicant-committed measures and other mitigation (see EIS Appendix 4), residual impacts to wetlands and surface waters would not be significant. MVE would be required to obtain a Clean Water Act Section 404 permit for the project. If the USACE deems warranted, compensatory mitigation would be required for the direct or indirect losses of aquatic resources. The compensatory mitigation measures the USACE deems are warranted would be described in the project's Section 404 permit from the USACE.

3.18 WILDLIFE

Project scoping identified four wildlife issues that are analyzed in detail in this section. The following additional issues are analyzed in brief in EIS Appendix 3:

- **AIB-55:** How would the project affect fish species and associated in-stream habitat?
- **AIB-56:** How would the project water use and blasting affect fish species, including salmon and steelhead (listed under the ESA)?
- **AIB-57:** How would the potential introduction or spread of nonnative plant species affect the quality of existing wildlife habitat?
- **AIB-58:** How would herbicide use impact soils, vegetation, and wildlife?
- **AIB-59:** Would dust from project roads affect vegetation, wildlife, and invertebrates?
- **AIB-60:** How would project infrastructure and equipment increase the risk of predation to wildlife by perching avian species? How would the project affect predator populations in the analysis area? How would the presence of new infrastructure increase predator access corridors and increase predation on general wildlife?
- **AIB-61:** How would the project affect wildlife habitat and territory use?

3.18.1 Wildlife Movement (non-game mammals and reptiles)

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.18-1. In this section, "wildlife movement" pertains specifically to the movement of non-game mammals and reptiles.

Table 3.18-1. Analysis Approach for Wildlife Movement (non-game mammals and reptiles)

Issue Analyzed in Detail	How would the presence of project facilities affect wildlife movement within the siting corridors and between the siting corridors and adjacent habitats?
Associated Issues Analyzed in Brief	AIB-63: How would loss or fragmentation of prey habitat and populations affect kit fox?
Analysis Area	The analysis area for wildlife movement is the area encompassed by the six fifth-level watersheds (USGS 2022) that intersect the siting corridors (Figure 3.18-1). The analysis area is bounded to the south by the Snake River and to the north by the watershed boundaries. This analysis area was chosen because it encompasses both the area where short-distance movement of smaller, less-mobile wildlife species may be impacted by project infrastructure, as well as neighboring blocks of habitat that may be used by the larger, wider-ranging wildlife species in the siting corridors. Although some wildlife species may move over even greater distances, the boundaries of the analysis area were chosen to prevent the dilution of impacts and focus the analysis on the connectivity of habitats within and immediately adjacent to the siting corridors and still provide context on a regional scale.
Indicators	Length of construction and decommissioning duration in years. Miles of new and improved access roads and change in road density. Miles of temporary fence. Proximity of project infrastructure to mapped wildlife linkages. Acres of ground disturbance.

Impacts Duration	The impacts duration for wildlife movement would be the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) when project noise and human presence would occur, plus an additional 50 years for successful reestablishment of native vegetation (see Section 3.15.1 [Native Upland Vegetation Communities]).
Data Sources	Project baseline reports to identify vegetation communities and habitat types in the analysis area (WEST 2020, 2021a). Species occurrence records (IDFG 2020). Wildlife linkages mapped by the IDFG and ITD (Geodata Services, Inc. 2007).
Assumptions or Approach	Since detailed site-specific data on movement patterns of wildlife in the analysis data are not available, it is assumed that wildlife movement (non-game mammals and reptiles) is generally concentrated in relatively undisturbed habitats that have the least existing barriers to movement (such as linear features such as roads, transmission lines, and pipelines).

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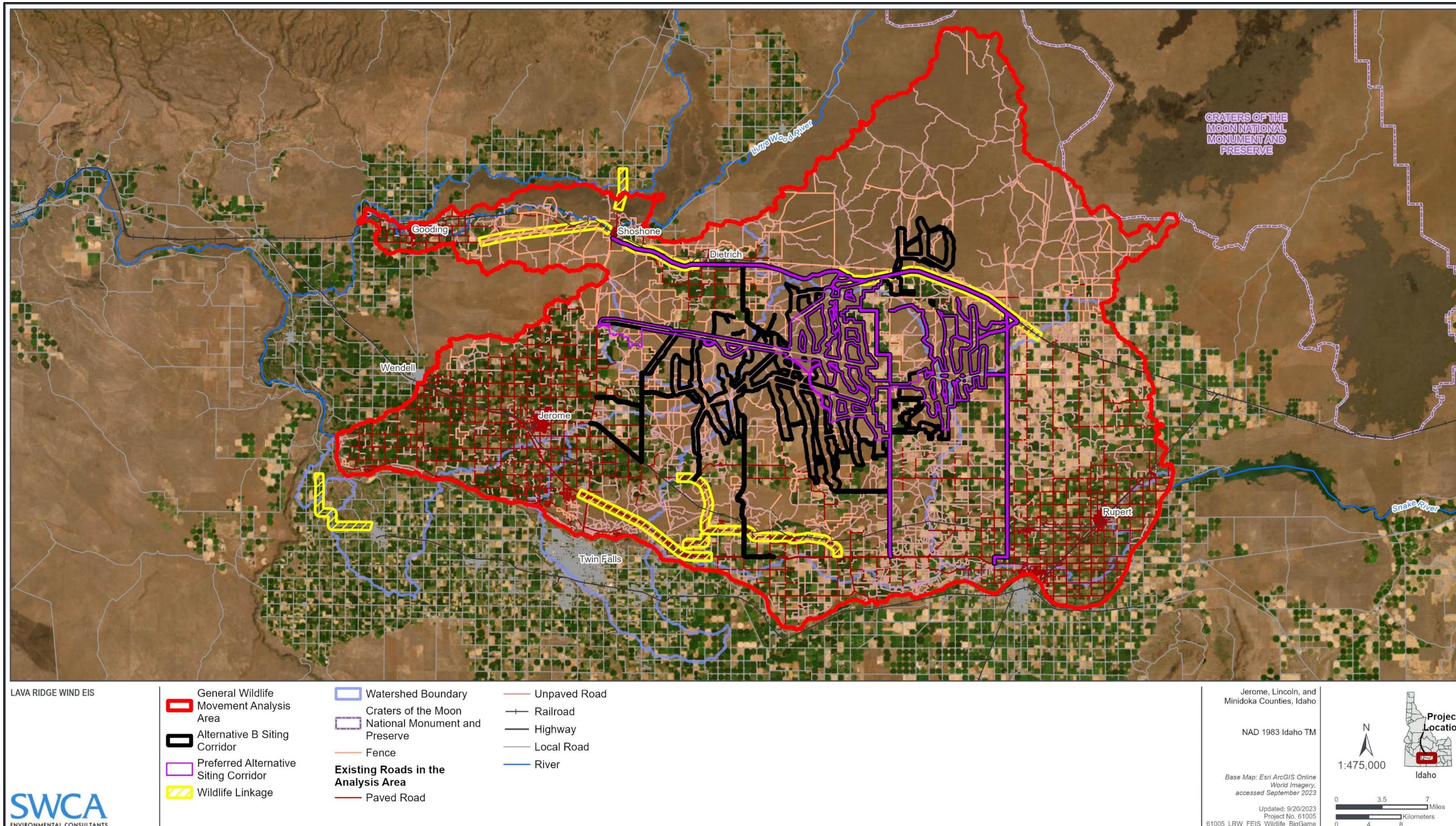

Figure 3.18-1. Wildlife movement (non-game mammals and reptiles) analysis area.

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3.18.1.1 Affected Environment

MVE conducted vegetation surveys (WEST 2020, 2021a) to characterize vegetation communities in the siting corridors. As detailed in Section 3.15.1 (Native Upland Vegetation Communities), the siting corridors are composed mostly of sagebrush steppe habitat, much of which has been previously disturbed by wildfire and wildfire rehabilitation seedings and/or previously grazed by livestock. As a result, invasive annual grasses such as a cheatgrass and seeded nonnative perennial crested wheatgrass are the dominant species throughout the siting corridors (as described further in Section 3.18.1.1.1 [Existing and Future Trends and Actions]).

Sagebrush steppe habitat and associated aquatic/mesic communities support a variety of wildlife species; a review of existing data sources (IDFG 2020) identified occurrences of four amphibian species, 73 bird species, 12 fish species, eight invertebrate species, 13 mammal species, and nine reptile species in the siting corridors and surrounding region, though these data likely underestimate the local biodiversity, especially for smaller, less-studied taxa. Pollinators and insects are discussed in Section 3.11, big game species are discussed in EIS Section 3.18.2, amphibians are discussed in Section 3.18.3, pygmy rabbit is discussed in Section 3.18.4, and avian and bat species are discussed in EIS Section 3.3. Fish are analyzed in brief (AIB-55) in EIS Appendix 3. Special-status wildlife were individually assessed for their potential to occur in the analysis area, and species that are unlikely to occur in the analysis area are addressed in Table App3-4 in EIS Appendix 3. Therefore, the discussion in this section focuses on the following species not discussed in other sections of this appendix and the EIS:

- Small mammal species such as shrews (*Sorex* spp.), voles, rabbits, squirrels (including Piute ground squirrel), and mice
- Larger non-game mammals such as coyote (*Canis latrans*), yellow-bellied marmot (*Marmota flaviventris*), and skunks
- A variety of reptiles such as lizards and numerous species of snake

These species have home ranges that span from 0.05 to 100 acres and dispersal distances that may be as great as 100 miles, as summarized in Table 3.18-2. Wildlife with smaller home ranges are unlikely to make long-distance movements across the analysis area, whereas species with larger home ranges or that disperse over a long distance are more likely to move extensively within the analysis area and may engage in long-distance movements across or through the analysis area.

Table 3.18-2. Wildlife Typical Home Ranges

Wildlife	Example species	Typical Home Range	Movement in the Analysis Area	Source
Small mammals	Shrews, voles, rabbits, squirrels, and mice	5 acres or less	Short distances within siting corridors	Aiken (2019); Groves et al. (1997); Wang et al. (2019)
Larger mammals	American badger (*Taxidea taxus*), coyote, yellow-bellied marmot, and skunks	From a few acres to 19,750 acres or more	Long distances between siting corridors and adjacent habitats (as much as 100 miles)	Groves et al. (1997); Tesky (1995)
Snakes	Western yellowbelly racer (*Coluber constrictor mormon*), Great Basin gophersnake (*Pituophis catenifer deserticola*), and wandering gartersnake (*Thamnophis elegans vagrens*)	Less than 15 acres but up to 250 acres	Short distances within siting corridors; longer distances between siting corridors and adjacent habitats	Finn et al. (2005); Fitch (1963); Groves et al. (1997); Miller et al. (2012); Rodriguez-Robles (2003); Zappalorti et al. (2015)
Lizards	Long-nosed leopard lizard (*Gambelia wislizenii*), greater short-horned lizard (*Phrynosoma hernandesi*), side-blotched lizard (*Uta stansburiana*), and tiger whiptail (*Aspidoscelis tigris*),	0.01 to 15 acres but up to 103 acres	Short distances within siting corridors	COSEWIC (2018); Groves et al. (1997); Palermo (2000); Perry and Garland (2002); Schorr et al. (2011)

Note: Home ranges vary by species, and ranges in this table summarize typical ranges across species that may occur in the analysis area based on available data for similar species.

Roads can act as barriers to movement due to mortality from collisions with vehicles or behavioral avoidance from vehicles and human activity (Shepard et al. 2008). The IDFG and ITD’s Fish and Wildlife Linkage Project (Geodata Services, Inc. 2007) used GIS modeling to identify segments of state and federal highways in Idaho where wildlife crossings may be concentrated due to proximity of important habitat, lower densities of human development, or both (see Figure 3.18-1). The linkage study focused on big game species but also considered reptiles, amphibians, and fish. The linkage study used data on species occurrence, land cover, human development, and road density (which was corroborated with roadkill data), to determine areas where wildlife are likely to cross highways. These wildlife linkages do not represent discrete wildlife movement corridors but provide some indication of areas where wildlife movement may be concentrated, or habitat connectivity may be higher. The linkage study focused on the area within 4 miles of state and federal highways, and thus its modeling output is not available for most of the analysis area. Additionally, the data used in the model are more than 15 years old and conditions may have changed since the linkages were first mapped. However, the same principles used to develop the linkage model apply to the analysis area as a whole, namely, that wildlife movement is likely to be concentrated in areas of relatively intact habitat with a low density of roads, agriculture, and other human development.

Other barriers to wildlife movement exist in the analysis area, including fences, roads, railroads, and utility corridors. Approximately 1,526 miles of existing paved roads and 2,440 miles of existing unpaved roads occur in the analysis area. Of the paved roads, 347 miles are interstates (I-84), U.S. highways (U.S. 26, 30, and 93), and state highways (ID 24, 25, 27, 46, 50, 74, and 75), which are typically fenced and present a larger barrier to wildlife movement than smaller roads. The UPRR runs from east to west through the analysis area. These highways, roads, and railroad fragment habitat and are an ongoing source of disturbance from human activity and direct mortality via vehicle strikes in the analysis area. Such habitat alteration, mortality, and behavioral disturbance contributes to restricting the movement of wildlife. Existing road density in the analysis area is 2.4 miles of road per square mile. There are 678 miles of mapped fencing located in the analysis area, with a density of 0.4 mile of fence per square mile.

3.18.1.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence wildlife movement in the 1,658-square-mile (1,060,978-acre) analysis area through habitat loss, alteration, and fragmentation. Approximately 586,161 acres (55%) of the analysis area are dominated by nonnative plant species, have been converted to agriculture or rural residential, are disturbed (contain roads and other development), are proposed for other renewable energy development, or are existing ROWs (which may be subject to ongoing and future surface and vegetation-disturbing activities and pesticide application for vegetation management). These areas are unlikely to provide suitable habitat for many wildlife species and contain substantial barriers to wildlife movement. An additional 343,072 acres (32%) of the analysis area have been subjected to wildfire, vegetation treatments, and seeding projects. Habitats in these areas may currently be altered or fragmented, which impacts wildlife movement, but could be restored or recover naturally over time. In total, these existing and future trends and actions have affected or will affect 929,233 acres (87%) of the analysis area.

As described in EIS Section 3.1.1 (Existing and Future Trends and Actions) and shown in EIS Figure 3.1-1, future development in the analysis area is likely to include improvements to U.S. 93 between I-84 and ID 25, improvements to the I-84/ID 50 interchange, construction of the SWIP-North transmission line, and construction of the Gateway West transmission line. The 1,500-MW Taurus Wind facility and several solar facilities are proposed west of the siting corridors within the analysis area. These projects would add more roads, fences, transmission lines, and human activity to the analysis area, all of which could be barriers to wildlife movement.

In particular, the Taurus Wind facility and the proposed solar facilities would involve development in or near several known areas of concentrated wildlife movement associated with wildlife linkages near Shoshone, Idaho. Roads and fencing constructed for those projects would further fragment habitat and introduce barriers to wildlife movement in the northwestern portion of the analysis area. The analysis assumes that because these projects are on BLM public land, they would require wildlife-friendly fences. The construction phase of the SWIP-North transmission line within the WEC running from the Midpoint Substation south would also increase the barriers to wildlife movement in the western portion of the analysis area and may impact known areas of concentrated wildlife movement associated with wildlife linkages south of Shoshone, Idaho, and to the north and east of Twin Falls, Idaho. These transmission lines may continue to impact the movement of some wildlife species following construction because of their reluctance to cross sparsely vegetated areas where they may be exposed to increased predation.

Most planned actions and their impacts on wildlife movement would occur in the western portion of the analysis area. Most of this development would occur in relatively undeveloped areas and would reduce the availability of suitable habitats for wildlife displaced by the Lava Ridge Wind Project.

3.18.1.2 Impacts

3.18.1.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and wildlife movement would only be affected by existing and future trends and actions.

3.18.1.2.2 ALTERNATIVE B (PROPOSED ACTION)

BLM (2005) identifies and discusses potential effects on wildlife during construction (2005:5-38–5-45), operation (2005:5-50–5-75), and decommissioning (2005:5-77) of a wind energy facility. These effects include modification, fragmentation, and reduction of habitat and interference with behavioral activities including avoidance of localized migratory routes. The discussion in BLM (2005) focuses primarily on effects to avian species, bats, and large game animals; therefore, an additional site-specific analysis for wildlife movement is provided in this section.

Habitat Loss and Fragmentation: Alternative B would remove 2,374 acres of potential wildlife habitat due to project infrastructure (Table 3.18-3). In addition to the effects that wildlife experience from this direct loss of habitat (see AIB-61 in EIS Appendix 3), habitat alteration from work area ground disturbance (6,740 acres) would also increase habitat fragmentation, which limits wildlife movement and isolates populations (Watson 2005) (Work areas would receive interim reclamation but could be re-disturbed at any time for maintenance during operation). Habitat alteration may have disproportionate effects on wildlife species with small home ranges or short dispersal distances; these species may be unable to shift their activity to avoid disturbed areas or disperse into other areas of suitable habitat that have become disconnected from their current home range. Species that have large ranges but high site fidelity may also be disproportionately affected because they too may be unable to shift their activity or disperse away from disturbance (University of Wyoming 2022). These effects would persist throughout the life of the project until the project is decommissioned and disturbed areas are reclaimed. The effects of habitat fragmentation on landscape connectivity and wildlife movement would persist for up to 50 years following decommissioning as native vegetation is reestablished (see Section 3.15.1 [Native Upland Vegetation Communities]). Early successional native vegetation communities would be the first to reestablish following decommissioning, and the residual effects of habitat fragmentation on wildlife movement would be less for wildlife adapted to these vegetation communities than for wildlife that inhabit mature, post-successional sagebrush vegetation.

Alternative B would have the most acres of siting corridors and ground disturbance spread across a larger area than the other action alternatives and would therefore alter or remove the most wildlife habitat of any of the action alternatives (approximately 9,114 total acres). Therefore, the effects of habitat fragmentation and reduced connectivity are expected to be the greatest under this alternative.

MVE’s applicant-committed measures to minimize work areas and infrastructure areas (measure 1) and use previously disturbed areas where feasible (measure 17 and BLM-required measure E) would minimize ground disturbance and habitat alteration. Disturbed areas would be restored to the pre-disturbance landforms and desired plant community at final reclamation (BLM-required measure P). These measures would minimize but not eliminate effects to wildlife habitat that could influence their movement.

Table 3.18-3. Summary of Impacts to Wildlife Movement (non-game mammals and reptiles)

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Estimated construction and decommissioning duration	Up to 2 years construction, up to 2 years decommissioning (Alternative B with Additional Measures would be up to 3 years construction, and up to 3 years decommissioning.)	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning	Up to 3 years construction, up to 3 years decommissioning
Miles of road	486 miles new 147 miles improved	360 miles new 117 miles improved	270 miles new 83 miles improved	272 miles new 101 miles improved	231 miles new 79 miles improved
Road density in analysis area	2.69 miles per square mile	2.61 miles per square mile	2.56 miles per square mile	2.56 miles per square mile	2.50 miles per square mile
Miles of temporary fence	395 miles	303 miles	222 miles	257 miles	200 miles
Acres of ground disturbance	Total: 9,114 acres Work areas: 6,740 acres Infrastructure: 2,374 acres	Total: 6,953 acres Work areas: 5,142 acres Infrastructure: 1,811 acres	Total: 4,838 acres Work areas: 3,714 acres Infrastructure: 1,124 acres	Total: 5,136 acres Work areas: 3,734 acres Infrastructure: 1,402 acres	Total: 4,492 acres Work areas: 3,500 acres Infrastructure: 992 acres

Source: USGS and DOA (2013).

Roads and Infrastructure: Studies on the effect of wind energy infrastructure on wildlife have been primarily limited to avian and bat species (which are addressed in EIS Section 3.3 [Avian and Bat Species]). Although more recent studies have examined effects to big game species (addressed in EIS Section 3.18.2) and domestic livestock (addressed in Section 3.9 [Livestock Grazing]), there is still relatively little scientific literature regarding the effects to other terrestrial wildlife species. Effects to small mammals would be similar to those described for pygmy rabbit in Section 3.18.4. Although studies specific to wind energy sites are generally lacking, studies on the effects of roads and other infrastructure have shown that edge habitat along access roads and utility ROWs may provide movement and dispersal corridors for small mammal species (Adams and Geis 1983; Helldin et al. 2012). Conversely, these roads may also present barriers to movement for some species (Kozakiewicz 1993; Qiang et al. 2006; Rico et al. 2007). Traffic volume appears to have relatively little effect on how frequently wildlife cross roads, but road material may be an important factor in wildlife movement across roads (Chen and Koprowski 2016; Rico et al. 2007). Some small mammal species avoid paved roads, whereas other species do not (Ji et al. 2017). As discussed in Section 3.18.1.1 (Affected Environment), wildlife using roadside habitat may have a higher likelihood of injury or mortality from collisions with vehicles or exposure to herbicides. Overall, these results suggest that the response of individual wildlife species to new access roads and other project infrastructure varies based on microhabitat preference and life history strategies.

One study of side-blotched lizard populations at several wind energy facilities near Palm Springs, California (Keehn et al. 2018), found that, although there was a weak negative effect on overall survival, there were no substantial effects on the demography or behavior of these lizards. However, the results also indicated that high levels of anthropogenic disturbance (quantified as an index of road type and density) were correlated with lower population growth rates, an adult-skewed age structure, and reduced body condition (Keehn et al. 2018). A 2009 review of 79 studies on the effects of roads on animal abundance (Fahrig and Rytwinski 2009) observed that roads had negative effects on amphibians, reptiles, and large mammals; had no effect or negative effects on mid-sized mammals; and had no effect or positive effects on small mammals. Overall, these studies suggest that wind energy infrastructure has little to no effect on smaller terrestrial wildlife species, but that increasing road density is likely to have negative impacts on most wildlife species. If roads are decommissioned at the end of the project, effects of project roads would cease after decommissioning and reclamation is complete. It possible that the BLM would choose to leave roads in place, and therefore the effects of the roads on wildlife movement would be permanent.

Alternative B would construct 486 miles of new access roads and improve 147 miles of existing roads in the analysis area (see Table 3.18-3). This would increase the road density in the analysis area from 2.39 miles per square mile to 2.69 miles per square mile. These roads and other project infrastructure would further fragment the landscape in the analysis area and increase the barriers to wildlife movement. Wildlife movement is likely to be more affected by Alternative B than the other action alternatives because new access roads and infrastructure would be spread across a relatively undeveloped portion of the analysis area, instead of concentrated in areas of existing development. Species with small home ranges would be impacted across a larger portion of the analysis area, and species with larger home ranges or those dispersing through the analysis area would be more likely to encounter barriers to movement, and may have to pass through more siting corridors than under the other action alternatives.

Unlike the other action alternatives, Alternative B would include siting corridors that overlap with or are near several wildlife linkages south and west of the analysis area. Development would also occur along both sides of the wildlife linkage associated with ID 24, which would have greater impacts on habitat connectivity and wildlife movement in this area than the other action alternatives (that do not place siting corridors near this linkage). Given this, Alternative B is likely to have more impacts on known areas of habitat connectivity and concentrated wildlife movement in the analysis area than the other action alternatives.

MVE's applicant-committed measures to minimize road lengths and widths (measure 4) and encourage construction workers to carpool (measure 39) would minimize road construction and potentially minimize traffic. Project personnel during all project phases would be required to drive 25 mph or less on non-public project roads, be alert for wildlife, and use additional caution in low-visibility conditions when driving any vehicle (applicant-committed measure 33). These measures would minimize but not eliminate effects to wildlife movement from roads and traffic.

Noise: The increase in noise and human presence would be greatest during the 2-year construction phase and 2-year decommissioning phase, when noise may be increased within approximately 7 miles of the noise source (SWCA 2022). Noise would be loudest close to the source and decrease with distance from the source. Increased noise can disturb or displace wildlife and disrupt wildlife moving within or through the analysis area. However, construction would be phased and would only occur in a small portion of the analysis area at any given time, and therefore, larger mammals and other wildlife species with large home ranges or long dispersal distances would most likely be able to shift their activity to avoid active construction sites when moving through the analysis area. Although temporary and localized, the negative effects of noise and human presence on wildlife movement could be greater for small mammals, snakes, and lizards with very small home ranges or short dispersal distances that may not be able to shift their activity to avoid these disturbances. Blasting would also occur approximately twice per day during the 2-year construction phase. Although individual blasts may disturb or displace wildlife, they would be unlikely to lead to long-term effects on wildlife movement because blasting would not occur repeatedly in the same area over a long period of time. MVE has committed to a number of measures to minimize or avoid impacts to wildlife movement from noise and disturbance (see Tables App4-2a, App4-2b, App4-2e, and App4-2i in EIS Appendix 4) and would ensure that these measures are implemented through the ECMP and worker training (applicant-committed measure 6). The timing and spatial restrictions for big game and greater sage-grouse in the ECMP would also benefit general wildlife movement by limiting project-related disturbance during sensitive time periods (i.e., winter) and in sensitive habitats (i.e., sagebrush).

During operation, turbines would create sound levels up to 85.3 dB at ground level at the source (SWCA 2022). Although constant exposure to this level of sound can affect the hearing of wildlife, wildlife would be unlikely to have constant exposure because they would likely avoid loud noise sources. As a result, turbine noise may lead to long-term impacts on wildlife movement (BLM 2005:6–19), although the response of individual species to turbine noise is not well studied (Arnett et al. 2007). Since Alternative B would increase noise and human presence over the largest area and would likely include more turbines than other action alternatives, it would have the greatest short- and long-term impacts on wildlife movement related to noise and human presence.

Fencing: Permanent security fencing (chain link) would be installed around substations and the operation and maintenance building and would remain in place throughout facility operation until it is removed during decommissioning. Temporary construction and livestock fencing would also be used during construction and decommissioning but would not be left in place during operation. Approximately 395 miles of temporary livestock fences would be installed along some roads to isolate livestock pastures. Temporary fences could be electric. As per BLM-required mitigation measure Y (see Table App4-3 in EIS Appendix 4), fence design would follow the BLM fencing handbook H-1741-1 (BLM 1989), which specifies maximum fence heights and minimum bottom wire heights (40 inches and 18 inches, respectively) and associated wire spacings to facilitate more efficient passage of wildlife. MVE would install the minimum amount of fencing needed to ensure the safety and security of project components (applicant-committed measure 43). Only a fraction of the 395 total miles of temporary livestock fencing would be deployed at any one time because construction within the Star Lake allotment would be phased, and temporary fences for each phase would be removed as construction proceeds to the next phase.

Impermeable fences (such as chain-link security fencing) can completely block most wildlife movement (Said et al. 2016; Woodroffe et al. 2014), whereas semipermeable fences (such as wire fencing used for livestock) allow a degree of permeability, but may still reduce movement efficiency and compromise the ability of wildlife to access resources (Cozzi et al. 2013; Jakes et al. 2018). Since roads present a barrier to wildlife movement without fences, the installation of temporary fencing around or along these features is unlikely to substantially increase the barrier to movement posed by those features, especially because wildlife-friendly fencing would be used.

Alternative B would have the most fencing of the action alternatives (see Table 3.18-3), which would contribute to the greatest increase in barriers to wildlife movement in the analysis area. Roads and fencing would have greater impacts on wildlife with large home ranges or long dispersal distances, which are more likely to encounter these barriers to movement than species with smaller home ranges or short dispersal distances.

Summary: In summary, while MVE would implement a variety of applicant-committed measures and required mitigation to minimize or avoid ground-disturbance, road construction, and fencing (see Tables App4-2 and App4-3 in EIS Appendix 4), Alternative B would still have the largest ground disturbance footprint, have the most new and improved access roads, and require more fencing than any of the action alternatives. Alternative B siting corridors would also span a greater portion of the relatively undeveloped land in the center of the analysis area than the other action alternatives, and given this, would have the largest area with barriers to movement for both smaller wildlife with small home ranges and larger wildlife that move extensively within or disperse through the analysis area. Alternative B would also have the most development near mapped wildlife linkages where wildlife movement is likely to be concentrated; therefore, Alternative B could have more effects on wildlife movement in the analysis area than the other action alternatives. While MVE's applicant-committed measures would minimize road construction and vehicle traffic, which reduces the potential impacts to wildlife movement, the extensive network of roads and fencing proposed under Alternative B could still substantially impact the ability of some species to move through or across the analysis area. Since the siting corridors for Alternative B are spread across such a larger portion of the analysis area, affected wildlife may not be able to shift their movement to avoid project-related disturbance, and for some individuals or populations, this effect could be substantial. At a landscape scale, Alternative B would substantially fragment a large portion of the undeveloped land remaining in the analysis area, which would reduce overall habitat connectivity. This could have substantial effects on individuals or local populations of wildlife species with large home ranges or long dispersal distances. Species that use sagebrush steppe habitats similar to those preferred by greater sage-grouse (see EIS Section 3.3.4) would benefit from many of the BLM-required mitigation measures (see Table App4-3 in EIS Appendix 4).

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE [2023]) that MVE would be required to implement under Alternative B to minimize impacts to wildlife movement. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for wildlife movement are summarized in Table 3.18-4 and detailed in EIS Appendix 4.

Table 3.18-4. Mitigation for Wildlife Movement (non-game mammals and reptiles)

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	E	a
4	P	l
6	Y	o
17	–	oo
33	–	pp
39	–	–
33	–	–
43	–	–
43	–	–

Note: All measures are detailed in EIS Appendix 4.

Additional measure a would further reduce impacts to wildlife by extending the duration of avoidance and minimization measures, and additional measure l would reduce impacts to general wildlife from vehicle strikes. The WEAP and annual reporting would help ensure that mitigation measures for wildlife are implemented as required. Additional measures to minimize impacts to native vegetation (see Section 3.15.2.2.2) and wetlands and water resources (see Section 3.17.4.2.2) would further reduce impacts to wildlife and their habitat. Seasonal timing restrictions for big game (see EIS Section 3.18.2.2.2) and sage-grouse (see EIS Section 3.3.4.2.2) would also reduce impacts to general wildlife movement in the areas where they are implemented. Although most wildlife are not engaged in long-distance migratory movements during the winter when timing restrictions would be in place for big game, impacts to shorter-distance movements within overwintering habitats would be avoided. This would reduce the potential for project activities to impact wildlife at the time of year when resources are most scarce and the effect of increased energy expenditure would be greatest. Overall, these measures would further minimize but not eliminate effects to wildlife movement from the project.

3.18.1.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of impacts to wildlife movement from Alternative C would be similar to Alternative B; however, the magnitude of impacts would be less because Alternative C would require fewer roads and fences (see Table 3.18-3) and would result in less road density (2.61 miles of road per square mile). Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures. Alternative C would alter or remove approximately 6,953 acres of wildlife habitat, which is roughly 2,161 less acres than Alternative B. Alternative C would eliminate several of the westernmost siting corridors, which would concentrate development in the remaining siting corridors to the east. Although this may result in greater impacts to wildlife movement in the eastern portion of the analysis area, it would leave the large block of mostly undeveloped land to the west relatively intact, which would reduce the impacts to wildlife movement in the west. As with Alternative B, the phased approach to construction and seasonal timing restrictions under Alternative C would further minimize the potential impacts to wildlife movement because concentrating construction activities into smaller areas would reduce short-term disturbance and displacement effects and allow wildlife to move through the siting corridors more freely. As a result, Alternative C would have fewer impacts on the areas of known habitat connectivity and concentrated wildlife movement associated with the wildlife linkages south and west of the analysis area. Alternative C would also eliminate the siting corridors to the north of the wildlife linkage along ID 24, which would reduce habitat fragmentation and introduce fewer barriers to wildlife moving through the northern portion of the analysis area.

Since the number and spatial extent of siting corridors would be reduced under this alternative, wildlife with larger home ranges (or those that disperse across or through the analysis area) would encounter fewer barriers to movement. Also, large areas of relatively undisturbed land would be left to the west and south of the siting corridors, which would provide greater opportunities for wildlife to shift their movements to avoid areas of disturbance. Wildlife species with smaller home ranges would also experience fewer impacts under Alternative C because fewer individuals or populations would be directly impacted by habitat alteration and fragmentation. There would be fewer barriers to individuals or populations dispersing to avoid project-related disturbance, and more intact habitat would remain for these individuals or populations to relocate to. Further, this alternative would limit development near known areas of concentrated wildlife movements. Therefore, Alternative C would have substantially fewer impacts on wildlife movement in the analysis area than Alternative B but would have greater impacts than Alternative D, Alternative E, and the Preferred Alternative.

3.18.1.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects to wildlife movement from Alternative D would be similar to Alternative B; however, the magnitude of effects would be greatly reduced because Alternative D would alter less habitat and would require fewer roads and temporary fences than any other action alternative except the Preferred Alternative (see Table 3.18-3). The increase in road density in the analysis area would be less than Alternatives B and C, and the centralization of this disturbance would decrease habitat fragmentation, which would create fewer barriers to wildlife movement in the analysis area. Alternative D would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, including construction phasing and seasonal timing restrictions. Given this, of the action alternatives, only Alternative E and the Preferred Alternative would further reduce impacts on wildlife movement in the analysis area.

Alternative D would not only eliminate the same siting corridors as Alternative C, but it would also eliminate most of the siting corridors east of Crestview Road to reduce development in areas that have higher sagebrush cover. The reduction of the overall project footprint along with the reduction in the number of turbines and associated infrastructure (i.e., roads and fences) would considerably reduce the impacts to wildlife movement in the analysis area. Specifically, by reducing development in the remaining areas of relatively intact native vegetation, Alternative D would result in the least amount of habitat fragmentation. It would leave large blocks of relatively intact habitat to the east and west of the siting corridors, which may allow wildlife to adjust their movement patterns to avoid project-related disturbance without the need to move through agricultural or residential areas. As with Alternative C, this is likely to reduce impacts to areas of known habitat connectivity and concentrated wildlife movement associated with the wildlife linkages south and west of the analysis area. However, in contrast to Alternative C, this action alternative would include the least development near the wildlife linkage associated with ID 24 and would have the least amount of impact on habitat connectivity and wildlife movement in the northern portion of the analysis area.

3.18.1.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of impacts to wildlife movement from Alternative E would be similar to Alternative B; however, the magnitude of effects would be greatly reduced. Alternative E would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, including construction phasing and seasonal timing restrictions. Alternative E would have more ground disturbance (5,137 acres total) and would require more roads and temporary fencing than Alternative D and the Preferred Alternative (see Table 3.18-3). The road density in the analysis area would increase from 2.39 to 2.56 miles of road per square mile. Alternative E would not only eliminate the same siting corridors as Alternative C but would also reduce or eliminate siting corridors west of

Crestview Road and south of the existing WEC (see EIS Figure 2.4-2). The reduced project footprint and concentration of development in a smaller area would lessen fragmentation of wildlife habitat and limit impacts in the relatively undeveloped portions of the analysis area.

Alternative E would retain the siting corridors in the northeast portion of the analysis area that would be eliminated under Alternative D and would therefore have greater impacts on the known area of concentrated wildlife movement associated with the wildlife linkage along ID 24. However, Alternative E and the Preferred Alternative would involve the least development in other known areas of wildlife movement south and west of the analysis area. Otherwise, the magnitude of Alternative E's impact on wildlife movement would be similar to Alternative D.

3.18.1.2.6 PREFERRED ALTERNATIVE

The types and duration of impacts to wildlife movement from the Preferred Alternative would be similar to Alternative B; however, the magnitude of effects would be greatly reduced. The Preferred Alternative would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, including construction phasing and seasonal timing restrictions. The Preferred Alternative would have the least ground disturbance (4,492 acres total) and the least temporary fencing of the action alternatives (see Table 3.18-3). The road density in the analysis area would increase from 2.39 to 2.50 miles of road per square mile. The siting corridors eliminated under the Preferred Alternative would be similar to those eliminated under Alternative E (see EIS Figure 2.4-2). The reduced project footprint and concentration of development in a smaller area would lessen fragmentation of wildlife habitat and limit impacts in the relatively undeveloped portions of the analysis area.

The Preferred Alternative would retain the siting corridors in the northeast portion of the analysis area that would be eliminated under Alternative D and would therefore have greater impacts on the known area of concentrated wildlife movement associated with the wildlife linkage along ID 24. However, Alternative E and the Preferred Alternative would involve the least development in other known areas of wildlife movement in the south and west of the analysis area. Overall, the magnitude of the Preferred Alternative's impact on wildlife movement would be similar to Alternative E.

3.18.1.2.7 CUMULATIVE IMPACTS

As described in Section 3.18.1.1 (Affected Environment), approximately 87% of the analysis area has been or will be altered due to agriculture, nonnative plants, roads, development, wildfire, vegetation treatments, and reseeding projects. This alteration has fragmented habitats in the analysis area and has concentrated wildlife movement in the remaining areas of relatively undisturbed habitats. The existing and future trends and actions combined with the project would further degrade and fragment habitat for wildlife and increase barriers to movement in the analysis area.

Alternative B includes siting corridors near many of the same wildlife linkages that would be impacted by development of the Taurus Wind facility and the SWIP-North transmission line. This would compound the effects to known areas of concentrated wildlife movement associated with these linkages. Alternative B, when combined with these planned actions, is likely to substantially reduce wildlife movement in the western portion of the analysis area. The loss, alteration, and fragmentation of a substantial portion of the remaining wildlife habitat in this area and the introduction of numerous barriers to wildlife could render this area less suitable for species with large home ranges and could prevent wildlife with long dispersal distances from moving across or through this portion of the analysis area. These species may experience greater impacts from future development because the barriers to movement would increase in multiple locations across their range and habitat availability and connectivity would be reduced overall.

Species with small home ranges may be entirely displaced by disturbance and could have difficulty relocating to avoid project-related disturbance due to the large amount of habitat that would be impacted and the numerous barriers to movement that would be introduced. Although individual populations of species with smaller home ranges and shorter dispersal distances would only be impacted by existing and future trends and actions occurring within or immediately adjacent to their territories, the general trend toward increased energy development and human population growth in the analysis area could affect many populations simultaneously. Therefore, although Alternative B alone may not substantially reduce the movement of most smaller wildlife, when the alternative is considered in combination with existing and future trends and actions, the effects would cumulatively contribute to reduced movement for these populations as a whole.

Alternative C would eliminate the siting corridors near the SWIP-North transmission line corridor and the proposed Taurus Wind facility, which would substantially reduce the impacts to wildlife movement in the western portion of the analysis area by preserving a corridor of relatively undisturbed habitat that wildlife could use to avoid those projects. There is a high density of mapped wildlife linkages in the southern and western portions of the analysis area where these future projects would occur, and reducing development in this area may lead to a much larger reduction in impacts to wildlife movement than reducing development in other portions of the analysis areas where wildlife movement is not known to be concentrated. Therefore, when combined with the effects of these existing and future trends and actions, Alternative C is much less likely to result in substantial reductions to wildlife movement than Alternative B.

Alternative D, Alternative E, and the Preferred Alternative would avoid placing siting corridors near other future planned actions in the analysis area and would reduce the size of the project in comparison to Alternatives B and C. Given this, these alternatives would have the smallest contributions to cumulative impacts on wildlife movement, particularly in the western and southern portions of the analysis area. This would reduce the overall potential to substantially reduce wildlife movement in the analysis area.

3.18.1.3 Significance Determination

Under all action alternatives with measures in Table 3.18-4, adverse impacts to non-game mammals and reptile movement would not be significant and would not result in a trend toward listing under the ESA or result in a loss of population viability. The increase in disturbance to vegetation and road density would impact less than 1% of general wildlife habitat and would contribute to habitat fragmentation and movement barriers for the life of the project. However, the existing highways likely provide greater barriers to general wildlife movement than the proposed project gravel roads would (Chen and Koprowski 2016; Rico et al. 2007). These impacts would not be significant because most areas would be reclaimed and restored in the interim and long term and because large areas of similar habitat would remain available in the broader landscape. The duration of impacts to some species could be as few as 5 years following interim reclamation.

3.18.1.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would result in irretrievable impacts on wildlife movement from habitat loss and fragmentation caused by ground disturbance for the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) until interim or final reclamation. This duration would be longer for species dependent on mature sagebrush communities. These impacts would not be irreversible because most areas would be reclaimed and restored in the interim and long term. Irreversible effects would occur post-project in areas where impacts to soils and vegetation would be permanent (see Section 3.13.1.4 [Soils] and 3.15.1.4 [Upland Native Vegetation Communities]), but the small area permanently affected would be unlikely to notably impact wildlife movement. Because of the small scale of this adverse effect, it would not be significant.

3.18.2 Big Game Habitats and Populations (see main EIS)

3.18.3 Amphibians

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.18-5.

Table 3.18-5. Analysis Approach for Amphibians

Issue Analyzed in Detail	How would the project affect amphibian breeding habitat and populations?
Analysis Area	The 13,950-acre analysis area for amphibians is potential breeding habitat. For this analysis, amphibian breeding habitat is defined as riparian or wetland vegetation (Figure 3.18-2), water features (including irrigation canals), and the area within 330 feet (100 m) of these vegetation types and water sources. This is the minimum recommended buffer for maintaining the unique ecological functions of important habitat features for amphibians, as described in the *Habitat Management Guidelines for Amphibians and Reptiles of the Northwestern United States and Canada* (Pilliod and Wind 2008). The analysis area extends beyond the siting corridors in some locations due to the 330-foot buffer.
Indicator	Acres of ground disturbance in potential amphibian breeding habitat (defined below)
Impacts Duration	The impacts duration would be the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus an estimated 10 years for amphibian breeding habitats to reestablish after final reclamation , estimated to last 44 to 46 years.
Data Sources	Species occurrence records (IDFG 2020). Publicly available data on amphibian species distribution, abundance, and population trends.

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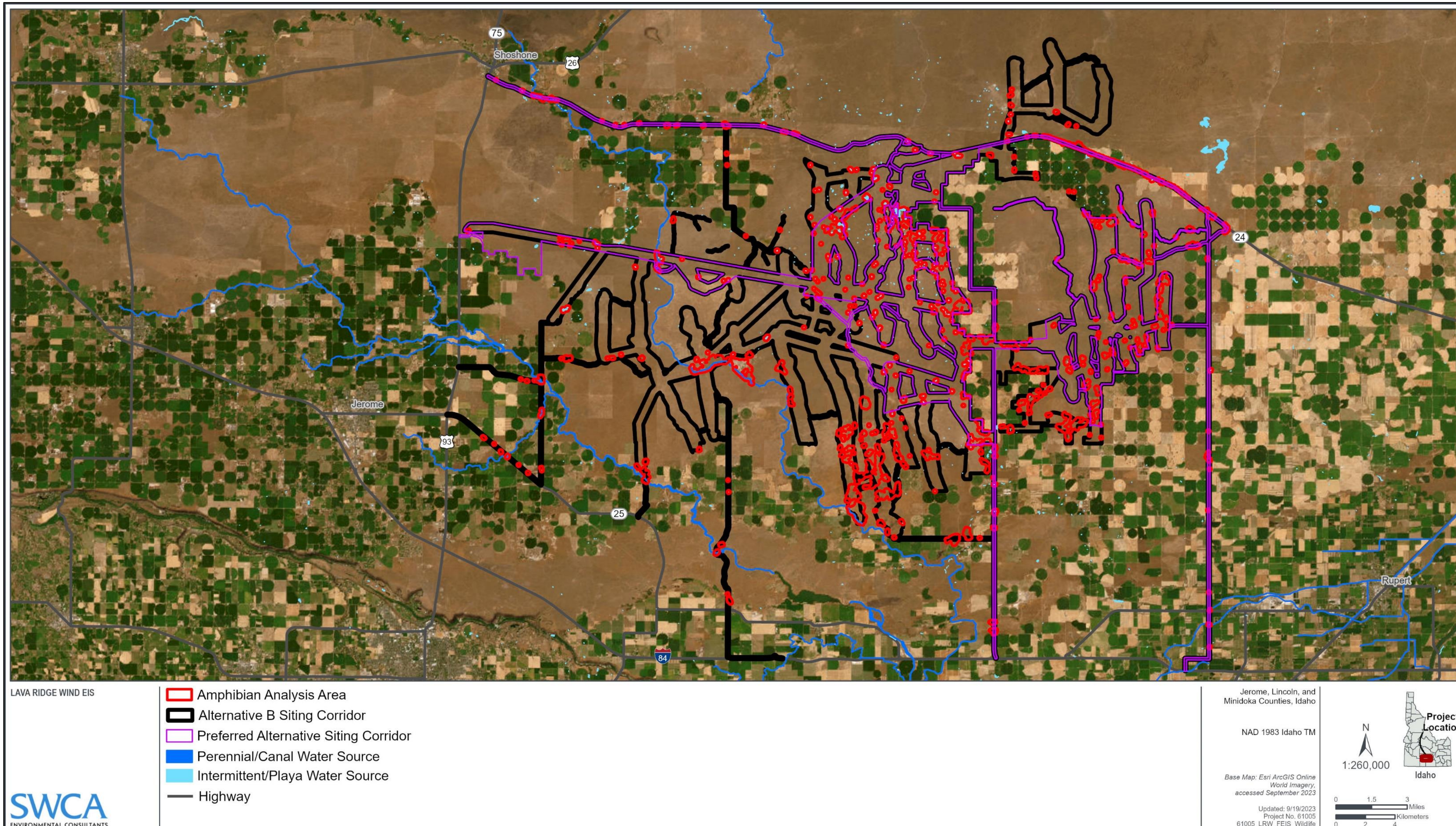

Figure 3.18-2. Amphibian analysis area.

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3.18.3.1 Affected Environment

Potential amphibian breeding habitat in the siting corridors is limited and consists primarily of wetland or riparian vegetation associated with intermittently flooded playas and vernal pools, excavated stock ponds, and two irrigation canals. These small, isolated water features are scattered widely across the landscape. There are no perennial streams or other natural waterbodies or wetlands in the siting corridors; the playas and vernal pools are infrequently inundated and do not support extensive wetland or aquatic vegetation (WEST 2021b). However, in particularly wet years, water levels are likely high enough to (at least partially) submerge grasses and shrubs along the edges of these depressions, which may provide a suitable egg-laying substrate for amphibians. There are 10,514 acres of potential amphibian breeding habitat, as defined above, in the siting corridors (USGS and DOA 2013).

Between 2008 and 2009, the IDFG inventoried wildlife at vernal pools in southwestern Idaho (Weekley and Murphy 2012); although the inventory did not include any vernal pools in the siting corridors, several sites were inventoried near Tapper Lake, approximately 15 miles north of the siting corridors. Approximately 15% of the features visited during the inventory contained shallow water capable of supporting breeding amphibians (Weekley and Murphy 2012). Although many sites probably dried out before snowpack and road conditions improved enough to access the site, the brief period of inundation at many pools was insufficient to support successful amphibian breeding, and inundation occurred primarily in the winter months before amphibian breeding commences. Thus, most amphibian breeding is limited to larger pool complexes, and successful breeding may be dependent on winter precipitation. However, excavated stock ponds may also provide suitable breeding habitat for some amphibians (Weekley and Murphy 2012).

Special-status amphibians were individually assessed for their potential to occur in the siting corridors; special-status amphibians that are unlikely to occur in the siting corridors are addressed in Table App3-4 in Appendix 3 (Issues Analyzed in Brief). The only amphibian species (special-status or otherwise) that has been documented in the siting corridors is western toad (*Anaxyrus boreas*) (IDFG 2020). The western toad is listed as an Idaho SGCN (IDFG 2023) and as a sensitive species for the BLM SFO. This species is frequently recorded in agricultural areas immediately adjacent to the analysis area that provide more reliable sources of water and may be important breeding areas for many amphibian species. Although western toads have been documented breeding in excavated structures that are only seasonally wet, some form of vegetation or surface cover is required for egg laying, and this species is usually associated with permanent water sources, which it returns to year after year to breed. Western toads are primarily terrestrial but are typically found near a permanent water source (Sullivan 1994).

There are multiple records of Great Basin spadefoot (*Spea intermontana*), boreal chorus frog (*Pseudacris maculata*), Sierran treefrog (*Pseudacris sierra*), and western toad within 1 mile of the siting corridors near Dietrich (iNaturalist 2022). These records appear to be associated with stock tanks, irrigation canals, and irrigated pastures or cropland. Boreal chorus frogs breed in temporary ponds and small lakes and are typically found within 100 m of permanent or temporary water but have recorded as much as 500 m from water (Montana Natural Heritage Program and Montana Fish, Wildlife & Parks 2022a). Sierran treefrogs and northern Pacific chorus frogs (*Pseudacris regilla*) are closely related species that are primarily terrestrial and often found in grasslands, shrublands, and forests far from open water except during the breeding season (Nafis 2022). The Great Basin spadefoot is also well adapted to xeric (dry) conditions and burrows into loose, sandy soils in sagebrush flats to retain moisture. Breeding sites (water sources) are variable and differ each year depending on water levels and precipitation. Isolated ephemeral water sources may be important to Great Basin spadefoot reproduction, which occurs in short "explosive" bursts in particularly wet years. Great Basin spadefoot burrows can be several hundred meters or more from these breeding sites (Wyoming Game and Fish Department 2017).

The most commonly identified amphibian species in IDFG's inventory in southwest Idaho (Weekley and Murphy 2012) was northern Pacific chorus frog; individuals were also observed calling from adjacent meadow habitats away from standing water.

3.18.3.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence amphibian breeding habitat in the analysis area through habitat alteration and fragmentation, or conversion of native habitat to agriculture or rural residential. Approximately 5,543 acres (40%) of the analysis area have been converted to agricultural or rural residential, are disturbed (contain roads and other development), are existing ROWs, are dominated by nonnative vegetation communities, or are proposed for other renewable energy development. Conversion to rural residential or renewable energy development typically results in the near total loss of amphibian breeding habitat, whereas areas converted to agricultural use or dominated by nonnative vegetation may still provide suitable breeding and non-breeding habitat for amphibians. The analysis area is also part of several livestock grazing allotments, which often contain humanmade water sources that may be used by amphibians. Another 6,510 acres (47%) of the analysis area have experienced changes to native vegetation from wildfire, past vegetation treatments, and seeding projects. These areas may not currently provide suitable breeding habitat for amphibians but could be restored or naturally recover over time. Overall, these existing and future trends and actions have impacted or will impact 12,053 acres (87%) of the analysis area.

3.18.3.2 Impacts

3.18.3.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and amphibians would only be affected by existing and future trends and actions.

3.18.3.2.2 ALTERNATIVE B (PROPOSED ACTION)

The project would affect amphibians through habitat alteration, loss, and fragmentation (from work areas and infrastructure), direct injury or mortality, erosion and runoff, invasive vegetation, dust, noise, exposure to contaminants, and interference with behavioral activities. Effects to wildlife from invasive vegetation, exposure to contaminants (including herbicides), dust, and mortality from vehicle traffic and increased predation are described in EIS Appendix 3 (see AIBs 57, 58, 59, and 60). Effects to wildlife related to noise and behavioral interference are primarily described in Section 3.18.1 (Wildlife Movement [non-game mammals and reptiles]), additional discussion specific to amphibians is provided in this section as appropriate.

As described in BLM (2005), "any habitat effects could represent a significant impact to local wildlife, especially to species whose affected habitats are uncommon and not well represented in the surrounding landscape" (BLM 2005:5–43). Although amphibian species that occur in the analysis area use a variety of upland habitats outside the breeding season, all of these species rely on vegetated aquatic habitats for reproduction. Since these habitats are uncommon in the analysis area, amphibians may be disproportionately affected by the loss or alteration of these habitats due to the project. Thus, while BLM (2005) provides sufficient disclosure and analysis of the effect of habitat loss on general wildlife species (and thus was not analyzed in detail; see AIB-61 in EIS Appendix 3), additional site-specific discussion of potential impacts to amphibian breeding habitat is warranted. Under Alternative B, approximately 1,139 acres of potential amphibian breeding habitat would be disturbed by the project (8% of the habitat in the analysis area) (Table 3.18-6).

Amphibian species that use habitats farther from permanent water and that opportunistically select new breeding sites each year based on precipitation and water levels (i.e., Sierran treefrog, northern Pacific chorus frog, and Great Basin spadefoot,) are more likely to use the isolated and ephemeral water features in the analysis area for breeding than species that typically remain near permanent water and breed repeatedly at the same site (i.e., boreal chorus frog and western toad).

The Sierran treefrog, northern Pacific chorus frog, and Great Basin spadefoot are capable of dispersing long distances through upland habitats and may use intermittent and ephemeral water features in particularly wet years. These features may be particularly important for Great Basin spadefoot because this species relies on “explosive” breeding seasons in years with increased availability of temporary surface water to maintain its population. Therefore, for Sierran treefrog and northern Pacific chorus frog, the magnitude of impact is expected to increase linearly with the amount of ground disturbance required by the project, whereas the magnitude of impacts to Great Basin spadefoot would increase more rapidly as the amount of ground disturbance increases. If small quantities of habitat are altered or lost, amphibians may be able to use breeding habitat in the surrounding agricultural areas. However, this habitat may be less suitable for breeding, may already be occupied by amphibians, and may expose amphibians to increased injury or mortality. Additionally, the project would add barriers to amphibian movement (such as roads, vehicle traffic, and habitat fragmentation), which could decrease the ability of amphibians to disperse into surrounding agricultural areas.

The only sources of permanent surface water in the analysis area are humanmade features such as irrigation canals and stock tanks. Although some amphibian species are occasionally documented breeding in these types of water features, they generally lack suitable substrates or vegetation for egg laying. Given this, the analysis area does not provide suitable breeding habitat for boreal chorus frog or western toad. Records of these species in the analysis area are limited to observations in upland habitats, outside the breeding season. During the breeding season, these species are typically recorded near permanent or seasonally flooded water sources in the agricultural land surrounding the analysis area. Although these two species may experience other effects from the project (see Section 3.18.1 [Wildlife Movement (non-game mammals and reptiles)] for example), there would be little to no impact to their breeding habitat under any of the action alternatives.

In addition to the direct loss of amphibian habitat from ground disturbance, the quality of amphibian habitat in the analysis area could also be indirectly impacted by runoff and sedimentation from other disturbed areas. Increased sedimentation in playas and vernal pools may alter their hydrology and, over time, may reduce the size of these features or eliminate smaller features all together. Sedimentation may also shift the distribution or abundance of emergent vegetation amphibians use for egg-laying. Runoff may also carry hazardous chemicals and other pollutants to the aquatic habitats amphibians use for breeding. However, with the implementation of a stormwater pollution prevention plan (applicant-committed measure 120) and other applicant-committed measures that reduce the risk of stormwater runoff (measures 121 through 135), there potential for impacts to amphibians and their breeding habitat from runoff and sedimentation would be low.

Table 3.18-6. Summary of Impacts to Amphibians

Indicator	Alternative B	Alternative C	Alternative D	Alternative E	Preferred Alternative
Ground disturbance in potential amphibian breeding habitat	Total: 1,139 acres (91 acres in very fragile soils) Work areas: 843 acres (67 acres in very fragile soils) Infrastructure: 296 acres (24 acres in very fragile soils)	Total: 950 acres (57 acres in very fragile soils) Work areas: 702 acres (42 acres in very fragile soils) Infrastructure: 248 acres (15 acres in very fragile soils)	Total: 648 acres (55 acres in very fragile soils) Work areas: 498 acres (42 acres in very fragile soils) Infrastructure: 150 acres (13 acres in very fragile soils)	Total: 687 acres (43 acres in very fragile soils) Work areas: 499 acres (31 acres in very fragile soils) Infrastructure: 188 acres (12 acres in very fragile soils)	Total: 608 acres (36 acres in very fragile soils) Work areas: 474 acres (28 acres in very fragile soils) Infrastructure: 134 acres (8 acres in very fragile soils)

Source: NRCS (2020).

MVE's applicant-committed measures to reduce or avoid impacts to ecologically important habitats (measure 3), and avoid ground disturbance within 100 feet of wetlands, streams, and riparian areas (applicant-committed measure 136) would minimize impacts to amphibian habitat. If disturbance cannot be avoided in such areas, MVE would prepare site-specific plans and measures to mitigate these impacts, which would be incorporated into MVE (2023) and approved by the BLM prior to issuance of a notice to proceed. MVE would mark sensitive species habitat (such as wetlands) for avoidance with flags and signage (applicant-committed measure 14), and preconstruction clearance surveys for special-status species (applicant-committed measure 12). This would avoid or minimize most impacts to potential amphibian breeding habitat but would not address all impacts because a 330-foot buffer is considered the minimum necessary to protect important habitat features for breeding amphibians (Pilliod and Wind 2008) and because preconstruction surveys would not be required for amphibians that do not have a special-status designation. Since data are lacking on amphibian use and, more specifically, breeding activity in the analysis area, it is difficult to determine the magnitude of effect to amphibian populations. However, Alternative B would reduce amphibian breeding habitat in the analysis area more than the other action alternatives, and the consequences for any amphibian populations that regularly breed in the analysis area would be the greatest under this alternative. Impacts could be higher for populations of Great Basin spadefoot that breed in the analysis area because this species is more likely to use these isolated and ephemeral water features for breeding.

The effects to amphibian breeding habitat would persist throughout the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives). Most effects would cease after decommissioning as disturbed areas are reclaimed. However, successful restoration of playas and vernal pools may be particularly difficult, and there is potential for some effects to be permanent if reclamation does not restore the necessary hydrologic conditions needed to maintain these ephemeral surface water features. The 91 acres of very fragile soils in the analysis area that would be disturbed under Alternative B are also unlikely to be successfully restored and would continue to be unsuitable for breeding amphibians following decommissioning and reclamation (see Table 3.18-6). Additionally, the impacts analysis assumes that all access roads would be left in place permanently, and thus, any impacts to amphibian breeding habitat from access road construction would be permanent.

As discussed in Section 3.18.1.1 (Wildlife Movement [non-game mammals and reptiles]), increased noise and human presence, particularly during construction and decommissioning, could disturb wildlife, including amphibians. Although these effects would be temporary and localized, most of the amphibians considered in this analysis do not disperse across large distances, and their ability to avoid areas with increased noise and human presence is further limited by the patchy and scattered distribution of suitable amphibian breeding habitat in the siting corridors. Increased noise, particularly from traffic, can have physiological effects on frogs related to stress and may also impact breeding frogs by interfering with the calls they use to attract a mate and defend their territories (Kobisk 2021; Parris et al. 2009; Tennessen et al. 2014). Other studies have shown that frogs are more sensitive to new sources of noise and may adapt to noisy environments over time (Tennessen et al. 2018). MVE's applicant-committed measures to minimize new road construction (measure 4) and encourage carpooling for construction personnel (measure 39) would reduce the impacts of roads and project traffic on amphibians. Applicant-committed measures would help reduce project noise (measures 90 and 95), which would help minimize the effects of noise and increased human presence on amphibians and their breeding habitat. These applicant-committed measures would also minimize the potential for direct injury or mortality to amphibians during construction, and BLM (2005) concluded that sources of direct injury and mortality during operation would be too small to have population-level effects on wildlife (BLM 2005:5-68). Although impacts to amphibians related to increased noise, human presence, and direct injury or mortality would be greatest under Alternative B, with the implementation of applicant-committed measures the potential for population-level effects is low.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B to minimize impacts to amphibians. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for amphibians are summarized in Table 3.18-7 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.18-7. Mitigation for Amphibians

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
3	–	a
4	–	cc
12	–	oo
14	–	pp
39	–	t
90	–	–
95	–	–
121–136	–	–

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to amphibians and their breeding habitat by extending the duration of avoidance and minimization measures to the life of the project (measure a) and by requiring preconstruction clearance surveys, avoidance, and mitigation in all potential amphibian breeding habitat (measure t), not just habitat for special-status amphibians. Also, extending the no-disturbance buffer around wetlands would increase the likelihood of avoidance of impacts to amphibian habitats. The WEAP and annual report would help ensure that mitigation measures for amphibians are implemented as required. Additional measures to minimize impacts to native vegetation (see Section 3.15.1.2.2) and wetlands and water resources (see Section 3.17.4.2.2) would further reduce impacts to amphibians and their breeding habitat. With the implementation of these additional measures, potential breeding habitat for amphibians would be almost entirely avoided and additional mitigation would be required where avoidance is not possible; therefore, there would be relatively little impact to amphibians and their breeding habitat in the analysis area.

3.18.3.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B, though the magnitude of impacts would be lower. Several of the westernmost siting corridors would be eliminated under this alternative. As a result, Alternative C would disturb 950 acres (or 7%) of potential amphibian breeding habitat in the analysis area, which represents an approximately 17% reduction in comparison to Alternative B (see Table 3.18-6). Alternative C would implement the same applicant-committed measures as Alternative B with Additional Measures, which would require near-total avoidance of amphibian breeding habitat. These measures may allow for some limited development in amphibian breeding habitat, but would require site-specific plans and measures to mitigate those impacts. Even where direct impacts to amphibian breeding habitat are avoided, amphibians could still experience indirect impacts from noise and human disturbance, though these effects would also be minimized with the implementation applicant-committed measures and other mitigation. The smaller footprint of Alternative C would also limit these indirect effects to a smaller area. Overall, Alternative C would have less impact on amphibians and their breeding habitat than Alternative B, but would have greater impacts than Alternative D, Alternative E, and the Preferred Alternative.

3.18.3.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative B, though the magnitude of impacts would be considerably reduced. Alternative D would not only eliminate the same siting corridors as Alternative C, but it would also remove the siting corridors east of Crestview Road, which would reduce the total ground disturbance in amphibian breeding habitat to 648 acres (or 6% of amphibian breeding habitat in the analysis area) (see Table 3.18-6). This represents a 43% reduction in direct habitat disturbance in comparison to Alternative B and a corresponding decrease in potential impacts to amphibian breeding habitat, and consequently, impacts to amphibian populations. Alternative D would also include the same applicant-committed measures as Alternative B with Additional Measures, which would require near-total avoidance of amphibian breeding habitat and site-specific mitigation where avoidance is not possible. Since Alternative D has a smaller footprint than Alternatives B and C, indirect impacts would be further reduced. Overall, of the action alternatives, Alternative D would have the second-least impact on amphibians and their breeding habitat in the analysis area, after the Preferred Alternative.

3.18.3.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to those from Alternative B, though the magnitude of impacts would be considerably reduced. Alternative E would not only eliminate the same siting corridors as Alternative C, but it would also eliminate or reduce siting corridors west of Crestview Road and south of WEC. This would reduce the total ground disturbance to 687 acres (or 5% of the amphibian breeding habitat in the analysis area) (see Table 3.18-6). This represents a 40% decrease in direct habitat disturbance in comparison to Alternative B, which is similar to Alternative D and the Preferred Alternative. Since Alternative E would implement the same applicant-committed measures as Alternative B with Additional Measures, nearly all direct disturbance in amphibian breeding habitat would be avoided and site-specific mitigation would address impacts where avoidance is not possible. Overall, Alternative E would have less impact on amphibians and their breeding habitat than Alternatives B and C, but greater impacts than Alternative D and the Preferred Alternative.

3.18.3.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to those from Alternative B, though the magnitude of impacts would be considerably reduced. The siting corridors eliminated under the Preferred Alternative would be similar to those eliminated under Alternative E. This would reduce the total ground disturbance to 608 acres (or 4% of the amphibian breeding habitat in the analysis area) (see Table 3.18-6). This represents a 48% decrease in direct habitat disturbance in comparison to Alternative B, which is the most of any action alternative. Since the Preferred Alternative would implement the same applicant-committed measures as Alternative B with Additional Measures, nearly all direct disturbance in amphibian breeding habitat would be avoided and site-specific mitigation would address impacts where avoidance is not possible. Overall, of the action alternatives, the Preferred Alternative would have the least impact on amphibians and their breeding habitat in the analysis area.

3.18.3.2.7 CUMULATIVE IMPACTS

As described above, approximately 86% of the analysis area is disturbed (contains roads and other development); is an existing ROW; has been converted to agriculture or rural residential; is dominated by nonnative vegetation; is proposed for other renewable energy development; or has been subjected to wildfire, vegetation treatments, and reseeding. These portions of the analysis area may no longer provide functional breeding habitat for amphibians. Alternative B would disturb 8% of the analysis area—more than any other action alternative—which would further fragment and degrade the remaining amphibian breeding habitat in the analysis area. These impacts may not be as great where project-related disturbance overlaps with areas that have been previously disturbed by the existing and future trends described above. With the implementation of the additional measures described above, most of this direct disturbance would be avoided, and site-specific mitigation would be implemented where avoidance is not possible. However, since Alternative B would have the largest disturbance footprint in the analysis area, it would have the greatest potential for indirect impacts to amphibians and their breeding habitats, and thus, the largest contribution to cumulative effects.

Alternatives C through E and the Preferred Alternative would also avoid direct disturbance in amphibian breeding habitats, but would have smaller disturbance footprints in the analysis area, and thus, less potential for indirect effects. The proportion of the analysis area disturbed for each of these action alternatives, which represents their relative contribution to cumulative effects, is as follows:

- Alternative C: 7%
- Alternative D: 5%
- Alternative E: 5%
- Preferred Alternative: 4%

Since avoidance or mitigation would be required in amphibian breeding habitat in the analysis area under all action alternatives, and because habitat for breeding amphibians is abundant in the region surrounding the siting corridors, it is unlikely that the cumulative effects to amphibians and their breeding habitat would lead to population-level effects or cause a trend toward federal listing for special-status amphibian species in the analysis area.

3.18.3.3 Significance Determination

Under all action alternatives, potential adverse effects to amphibian breeding habitat and populations would not be significant. Although breeding habitats have been identified within the affected areas, with the implementation of the additional avoidance and minimization measures, these habitats would be almost entirely avoided, and, if not avoided, site-specific measures would reduce impacts and maintain functioning habitats. Since avoidance or mitigation would be required in amphibian breeding habitat in the analysis area under all action alternatives (see Table 3.18-7), and because habitat for breeding amphibians is abundant in the region surrounding the siting corridors, it is unlikely that effects to amphibians and their breeding habitat would lead to population-level effects or cause a trend toward listing under the ESA for special-status amphibian species in the analysis area.

3.18.3.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

Refer also to Section 3.17.4.4 (Wetlands and Surface Waters). All action alternatives would irretrievably affect some individual amphibians through habitat alteration, loss, and fragmentation until final reclamation. These effects would last at least 44 to 46 years—which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and 10 years for amphibian breeding habitats to reestablish after final reclamation—but would not be irreversible because most of the habitat would be reclaimed and restored in the long term. During the life of the project, some individual amphibians irretrievably affected would not be irreversibly affected because of the large amount of surrounding habitat available to these individuals. Irreversible effects would occur post-project in areas where very fragile soils are disturbed and reclamation potential is limited, where concrete foundations remain following decommissioning, and where the BLM may choose to leave roads in place, resulting in up to 247 acres of permanent amphibian breeding habitat loss under Alternative B and 154 acres under the Preferred Alternative.

3.18.4 Pygmy Rabbit

The issue analyzed in detail and the approach for the analysis are detailed in Table 3.18-8.

Table 3.18-8. Analysis Approach for Pygmy Rabbit

Issue Analyzed in Detail	How would the project affect the pygmy rabbit and its habitat?
Analysis Area	The analysis area for pygmy rabbit is potential pygmy rabbit habitat (areas with deep soils and tall, dense sagebrush that have not burned in the past 5 years) in the siting corridors (Figure 3.18-3). This 17,564-acre analysis area provides context for the change in habitat conditions from the project. Also, because the siting corridors are buffered for placement of infrastructure, they provide an appropriate area of analysis for which to estimate the scope of potential habitat alteration.
Indicators	Acres of ground disturbance in pygmy rabbit habitat. Miles of new access road in pygmy rabbit habitat. Traffic volume (trips per day).
Impacts Duration	The impacts duration for pygmy rabbit is the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) plus the longest estimated reclamation period for native vegetation communities (estimated to be 50 years; see Section 3.15.1 [Native Upland Vegetation Communities], for a total of 84 to 86 years. However, some impacts may be permanent, as described in this section.
Data Sources	BLM and IDFG species occurrence data. The project baseline report for pygmy rabbit (WEST 2021c).

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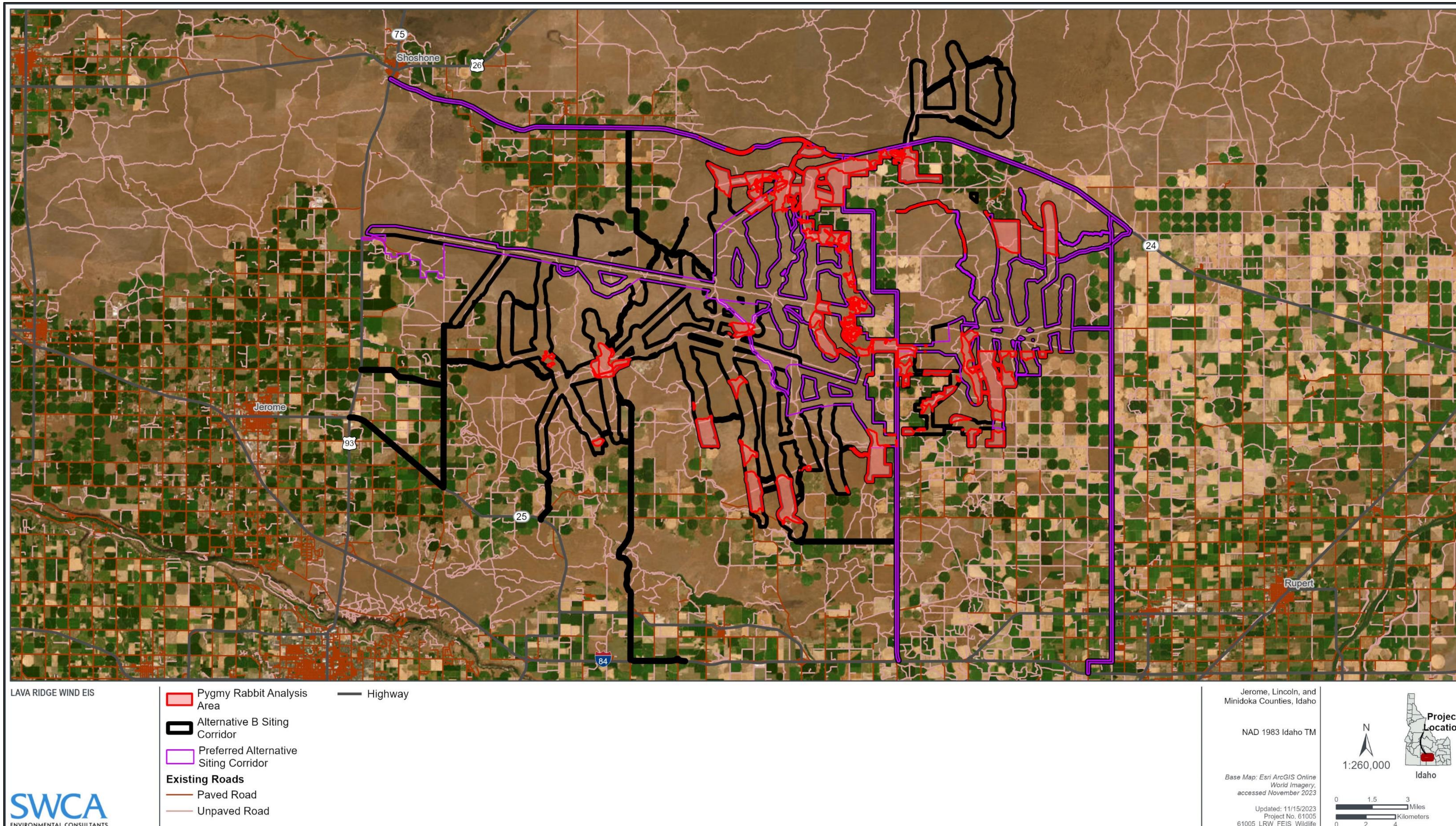

Figure 3.18-3. Pygmy rabbit analysis area.

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3.18.4.1 Affected Environment

The pygmy rabbit (*Brachylagus idahoensis*) is an Idaho SGCN (IDFG 2023) and a BLM SFO special-status species. Pygmy rabbits are generally limited to areas on deep soils with tall, dense sagebrush that they use for cover and food. In Idaho, pygmy rabbits prefer sagebrush islands, defined as dense sagebrush patches that are taller than the surrounding landscape (Ulmschneider 2004). Extensive, well-used runways interlace the sage thickets and provide travel and escape routes. Dense stands of big sagebrush along streams, roads, and fencerows provide dispersal corridors for pygmy rabbits (Green and Flinders 1980). Project surveys conducted between February 16 and February 18, 2021, did not document sagebrush islands in or adjacent to the parts of the analysis area that were surveyed (WEST 2021c); however, because the entire analysis area was not surveyed, absence of sagebrush islands in the analysis area cannot be assumed, and pygmy rabbits may occur in other, less-preferred sagebrush habitats. No pygmy rabbit individuals or sign (e.g., pellet, tracks, or visual observations) were observed during the surveys (WEST 2021c). Generally, potential habitat in the eastern portion of the analysis area is of higher quality than that in the central and western portions of the analysis area because lava rocks that would inhibit burrowing and/or cheatgrass are present at higher densities (WEST 2021c).

Potential pygmy rabbit habitat in and around the siting corridors was identified using a desktop assessment (WEST 2021c) that considered vegetation type, soil depth, and fire history factors (Rachlow and Svancara 2006). Approximately 31,761 acres of potential pygmy rabbit habitat were identified (WEST 2021c); 17,564 of those acres are located in the siting corridors, which is the analysis area for pygmy rabbit (see Figure 3.18-3). Since the soil and vegetation data used in the desktop analysis are relatively coarse, they may not capture all potential habitat pygmy rabbit habitat in the siting corridors. For example, some of the area south of Sid Butte in the easternmost siting corridors contains suitable soils and mature sagebrush, but were not mapped as such (Rawson 2022). Thus, potential pygmy rabbit habitat in the analysis area may be underestimated.

Field verification surveys were conducted in November 2020 to rank habitats in the survey area as poor, moderate, or high quality for pygmy rabbit using 100-foot survey corridors centered on turbine locations (based on February 2020 siting alignments, which were subsequently refined). Approximately 1,685 acres of this survey area were ranked as moderate or high quality and considered suitable habitat for pygmy rabbit (WEST 2021c). These 1,685 acres of suitable habitat were surveyed in February 2021 for pygmy rabbits, but no rabbits or their sign were observed. Three historical records of pygmy rabbit or pygmy rabbit sign were investigated during the field survey (two are observations of old burrows from 2002 surveys and one is an observation of a rabbit from 1918), only one of which (an observation of old burrows from 2002) is in the analysis area. Habitat near the 1918 observation has been converted to agriculture and is no longer suitable for pygmy rabbit. The two old burrow locations are located in suitable habitat; however, no burrows or other sign of pygmy rabbit were observed near these locations (WEST 2021c).

Due to the refinements to the siting corridors following the pygmy rabbit surveys, much of the suitable habitat surveyed falls outside the current siting corridors. Also due to these revisions, the analysis area consists of approximately 3,500 acres of habitat that meet the desktop analysis criteria for potential pygmy rabbit habitat but were not field verified or surveyed for pygmy rabbits. Although habitat in these unsurveyed areas is generally similar to adjacent habitats included in the pygmy rabbit surveys, no formal conclusions about pygmy rabbit presence in these areas can be made (WEST 2021c). There are two confirmed occurrences of pygmy rabbit from 2012 to the southeast of Dietrich, Idaho, that are fewer than 0.5 mile from the siting corridors (Lonsinger et al. 2012; Lonsinger 2012). Neither of these historical records were investigated during project pygmy rabbit surveys, but one of the historical records falls within 0.3 mile of a pygmy rabbit survey transect.

Pygmy rabbits have small home ranges and rarely travel over long distances. During winter, pygmy rabbits usually remain within 30 to 50 m (98 to 164 feet) of their burrows but may use several different burrows separated by up to 100 m (328 feet) (Katzner and Parker 1997). Pygmy rabbits expand their home range during the summer, and males move across larger distances than females. In southwestern Idaho, depending on the methodology used, home range estimates for pygmy rabbits ranged from 2.0 to 61.5 acres for males and 0.9 to 4.5 acres for females (Burak 2006). Home ranges appear to be larger in active rangelands than intact shrub steppe habitat, presumably due to the patchy availability of dense sagebrush stands in grazed areas (Katzner and Parker 1997). Adult pygmy rabbits have been documented dispersing up to 3 km (1.9 miles), but movements of 1 to 2 km (0.6 to 1.2 miles) appear to be more common (Burak 2006; Katzner and Parker 1997; Montana Natural Heritage Program and Montana Fish, Wildlife & Parks 2022b). Female juvenile pygmy rabbits studied in central Idaho dispersed an average distance of 1.0 km (0.6 mile), while males dispersed an average of distance of 2.9 km (1.8 miles), but dispersal distances as high has 11.9 km (7.4 miles) were recorded (Estes-Zumpf and Rachlow 2009). The results also showed that perennial streams and unpaved roads did not pose a barrier to dispersal, but that pygmy rabbits tended to disperse away from paved highways. Subsequent genetic analysis revealed longer juvenile dispersal distances for females but confirmed that perennial creeks and roads (both paved and unpaved) did not reduce gene flow, which was highest for populations separated by fewer than 14 km (8.7 miles) (Estes-Zumpf et al. 2010). Populations separated by agricultural development, however, showed little to no gene flow, indicating that agricultural development may pose a significant barrier to dispersing pygmy rabbits.

3.18.4.1.1 EXISTING AND FUTURE TRENDS AND ACTIONS

Existing and future trends and actions have and will continue to influence pygmy rabbit habitat in the analysis area through habitat loss, alteration, and fragmentation, particularly where those actions occur within suitable habitat for pygmy rabbit. Approximately 5,174 acres (29%) of the analysis area have been converted to agricultural or rural residential, are disturbed (contain roads and other development), are existing ROWs, are dominated by nonnative vegetation communities, or are proposed for other renewable energy development. These types of disturbance typically result in the near total loss of suitably pygmy rabbit habitat. The 4 miles of existing paved roads and 51 miles of existing unpaved roads in the analysis area contribute to habitat fragmentation and also present a current and ongoing risk of direct mortality via vehicle strikes for pygmy rabbit.

Another 10,742 acres (61%) of the analysis area have experienced changes to native vegetation from wildfire, past vegetation treatments, and seeding projects. These areas may not currently provide suitable habitat for pygmy rabbits but could be restored or naturally recover over time. Areas successfully seeded with sagebrush may be trending toward suitable habitat conditions for pygmy rabbit, but most seeded areas are likely to be dominated by perennial grasses (both native and nonnative) and are unlikely to be suitable habitat for pygmy rabbit.

Overall, these existing and future trends and actions have impacted or will impact 15,916 acres (90%) of the analysis area. Vegetation conditions will continue to change throughout the analysis area over the 84-year analysis time frame, and native vegetation (including mature sagebrush steppe habitat for pygmy rabbits) may recover in areas that have been disturbed.

3.18.4.2 Impacts

3.18.4.2.1 ALTERNATIVE A (NO ACTION)

Under Alternative A, existing and future trends and actions would occur as described under the affected environment. The project would not be developed, and the pygmy rabbit would only be affected by existing and future trends and actions.

3.18.4.2.2 ALTERNATIVE B (PROPOSED ACTION)

Under Alternative B, the project would affect pygmy rabbits through habitat alteration and loss (from work areas and infrastructure), disturbance and displacement (from noise, human presence, use of heavy equipment and machinery, vehicle use, vibrations, shadow flicker caused by moving blades), and injury or mortality (vehicle strikes and application of herbicides or pesticides). Given that pygmy rabbit was not detected during the project's wildlife baseline studies and that relatively little suitable habitat for the species has been observed in the siting corridors (WEST 2021c), it is unlikely that the siting corridors support large populations of the species.

Habitat Alteration and Loss

Ground disturbance and vegetation removal would reduce the number of existing native plants that may provide forage and breeding habitat for pygmy rabbit. A 2009 literature review of the effects of roads and traffic on animal distribution and abundance stated that small mammals are more likely to experience positive effects than other species groups (Fahrig and Rytwinski 2009). Multiple studies have shown that small mammal diversity is highest in edge habitats along roadsides and utility ROWs (Fahrig and Rytwinski 2009; Stacey and Post 2009). This effect is attributed to the increased food resources and cover provided by roadside vegetation and, possibly, a reduction in predators that are negatively affected by new road construction. Conversely, these new roads could expose pygmy rabbits to increased risk of injury or mortality from herbicide exposure and collision with vehicles (described below). Although studies on pygmy rabbit response to wind energy development are lacking, studies on pygmy rabbit response to oil and gas development (which has a pattern of surface disturbance similar to wind energy facilities) have shown reduced pygmy rabbit abundance in habitat fragmented by roads and reduced abundance in edge habitats created by surface disturbance (Germaine et al. 2017). Subsequent studies at oil and gas fields found pygmy rabbit occupancy and abundance was lower within 0.3 to 0.9 mile of roads (Germaine et al. 2020). Thus, pygmy rabbits are unlikely to experience the positive effects that have been documented for other small mammals, which is likely attributable to their dependence on tall, dense stands of sagebrush.

Alternative B would have the most ground disturbance (1,896 acres) and the most new roads (119 miles) in pygmy rabbit habitat (Table 3.18-9) of the action alternatives. Approximately 11% of the pygmy rabbit habitat in the analysis area could be lost or altered by project ground disturbance, the total miles of roads in pygmy rabbit habitat in the analysis area would more than triple from 55 miles to 174 miles. MVE's applicant-committed measures to minimize work areas and infrastructure areas (measure 1), use previously disturbed areas where feasible (measure 17 and BLM-required measure E), and minimize road lengths and widths (measure 4) would minimize but not eliminate ground disturbance and habitat alteration for pygmy rabbits.

MVE would conduct preconstruction clearance surveys in any suitable pygmy rabbit habitat (see Figure 3.18-3) where absence was not confirmed during project pygmy rabbit surveys (applicant-committed measure 12). If construction occurs outside the detection window for pygmy rabbits, MVE would work with the BLM to develop alternatives to minimize impacts. Any pygmy rabbit burrows that are identified would be avoided; if MVE determines that avoidance is not feasible, flushing individuals from burrows or relocation of individuals to suitable habitat would be considered and coordinated with the BLM (applicant-committed measure 13). Signs, flags, or fencing would be used to mark any pygmy rabbit avoidance areas (applicant-committed measure 14). These measures would minimize but not eliminate the potential for disturbance in occupied pygmy rabbit habitat.

Where disturbed areas are reclaimed, the effects of ground disturbance would cease following successful reestablishment of mature sagebrush, which is assumed to require 50 years. It is possible that the BLM would choose to leave project access roads in place; therefore, the effects of the roads on pygmy rabbit habitat would last for the life of the road. Due to the limited potential for successful reclamation of very fragile soils, approximately 19 acres of pygmy rabbit habitat in the analysis area would continue to be unsuitable for pygmy rabbits following decommissioning and reclamation (see Table 3.18-9). Since pygmy rabbits and greater sage-grouse (see EIS Section 3.3.4) share similar habitat requirements, the measures required by BLM policy to minimize disturbance in greater sage-grouse habitat (see Table App4-3 in EIS Appendix 4) may also reduce impacts to pygmy rabbit habitat.

Table 3.18-9. Summary of Impacts to Pygmy Rabbit

Indicator	Alternative B	Alternative B with Additional Measures	Alternative C	Alternative D	Alternative E	Preferred Alternative
Acres of ground disturbance in pygmy rabbit habitat	Work areas: 1,409 acres (14 acres very fragile soils) Infrastructure: 495 acres (5 acres very fragile soils)	Same as Alternative B	Work areas: 1,150 acres (14 acres very fragile soils) Infrastructure: 406 acres (5 acres very fragile soils)	Work areas: 760 acres (11 acres very fragile soils) Infrastructure: 230 acres (3 acres very fragile soils)	Work areas: 1,006 acres (13 acres very fragile soils) Infrastructure: 378 acres (5 acres very fragile soils)	Work areas: 1,068 acres (4 acres very fragile soils) Infrastructure: 303 acres (1 acre very fragile soils)
Miles of access roads in pygmy rabbit habitat	New: 119 miles Improved: 29 miles	Same as Alternative B	New: 94 miles Improved: 28 miles	New: 68 miles Improved: 19 miles	New: 90 miles Improved: 26 miles	New: 70 miles Improved: 23 miles
Average vehicle trips per day	Construction: 1,103 Operation: 38 Decommissioning: 1,270	Construction: 1,369 Operation: 38 Decommissioning: 1,261	Construction: 1,329 Operation: 37 Decommissioning: 1,241	Construction: 909 Operation: 27 Decommissioning: 1,068	Construction: 1,075 Operation: 26 Decommissioning: 958	Construction: 968 Operation: 23 Decommissioning: 978

Source: NRCS (2020).

Movement, Disturbance, and Displacement

Little is known about the response of pygmy rabbits to wind energy development; however, research suggests that small mammals, in general, are less susceptible to disturbance at wind energy facilities than large ungulates and carnivores and, in some instances, may experience beneficial effects (Helldin et al. 2012). Over time, repeated or prolonged exposure to human disturbance can lead to behavioral adaptations that allow individuals to become habituated to this disturbance (Helldin et al. 2012). Previous studies of small mammals at other construction sites have shown that these species are relatively tolerant of disturbance and may only shift their habitat use by a few hundred meters. As described above, pygmy rabbit abundance decreases near roads and other infrastructure at oil and gas facilities (Germaine et al. 2017; Germaine et al. 2020). Given the patchy and scattered nature of pygmy rabbit habitat in the siting corridors, pygmy rabbits displaced from these areas may have to cross large distances to reach patches of undisturbed habitat. Although pygmy rabbits are capable of dispersing across distances of over a mile (several kilometers) (Estes-Zumpf and Rachlow 2009), this exposes them to an increased risk of predation, especially where predators have increased as a result of habitat alteration and fragmentation (Germaine et al. 2017).

Surface disturbance may also create barriers to pygmy rabbit movement that further limit the ability of displaced individuals to disperse into undisturbed areas, and that can impact pygmy rabbit populations by contributing to genetic isolation and extirpation of populations from small habitat patches (Kozakiewicz 1993). There is disagreement in the scientific literature on the effect of roads and other linear disturbances on pygmy rabbit movement. Roads of all sizes appear to be a barrier to movement for most small mammal species, and wider roads are crossed less frequently than narrow roads (Rico et al. 2007). Small mammals have shown a range of responses to increasing traffic volume (Chen and Koprowski 2016; Rico et al. 2007), but the size and material of the road are more important than traffic volume (McGregor et al. 2008). One study of pygmy rabbit response to construction of a buried pipeline indicated that pygmy rabbits cross the pipeline ROW less frequently during construction and continued to cross less frequently after construction was complete (Edgel et al. 2018). Conversely, other studies have shown that unpaved roads have no effect on pygmy rabbit dispersal and did not reduce gene flow between local populations; pygmy rabbits did tend to disperse away from larger paved roads, but no reduction in gene flow was observed (Estes-Zumpf and Rachlow 2009; Estes-Zumpf et al. 2010). In one instance, gene flow appeared to be reduced between pygmy rabbit populations separated by a paved four-lane highway, but distance may have also played a factor (Thimmayya and Buskirk 2012). Thus, while new road construction and other linear disturbances may have some impacts on pygmy rabbit movement and dispersal, these effects are unlikely to have a substantial effect on their population in the analysis area. Nonetheless, Alternative B would result in the most ground disturbance and new road construction. The project would triple the miles of roads in pygmy rabbit habitat in the analysis area and would have the greatest impact on pygmy rabbit movement in the analysis area. MVE's applicant-committed measure to minimize road lengths and widths (measure 4) would minimize but not eliminate road-related impacts for pygmy rabbits.

Increased noise can alter behavioral patterns of animals (Mallord et al. 2007), though responses to noise depend on the intensity of perceived threats rather than the intensity of noise (Bowles 1995). Noise during construction can have short-term impacts, whereas turbine noise during operation can have long-term impacts. MVE's applicant-committed measures to conduct preconstruction clearance surveys in suitable pygmy rabbit habitat (measure 12), avoid pygmy rabbit burrows that are identified (measure 13), and adequately muffle construction equipment (measure 95) would minimize but not eliminate the potential for noise disturbance in occupied pygmy rabbit habitat.

Wildlife living near wind turbines can be affected by noise from turbine operation because the sound can disrupt vocal communication and impair the ability to hear approaching predators (Helldin et al. 2012). A study of California ground squirrels found that individuals living near turbines were more vigilant and more likely to return to their burrows in response to warning calls when compared to squirrels in a reference area without turbines (Rabin et al. 2006). Therefore, while pygmy rabbit may continue to occupy suitable habitat in the siting corridors during operation, they may be adversely impacted by noise from turbine operation. The effects of turbine noise on pygmy rabbit would cease after decommissioning, when turbines would be taken offline and removed from the site.

Alternative B would result in the most surface disturbance and the most roads in pygmy rabbit habitat (see Table 3.18-9), and therefore, would have the greatest effects to pygmy rabbit related to movement, disturbance, and displacement.

Injury and Mortality

Project traffic could injure or kill small mammals and collisions with vehicles can be an important factor contributing to mortality and may lead to local population declines (Rico et al. 2007). Alternative B traffic volume would be an average of 1,103 trips per day during construction and 38 trips per day during operation (see Table 3.18-9 and EIS Table 2.4-3). Alternative B would also triple the miles of road in pygmy rabbit habitat in the analysis area. MVE would encourage carpooling (applicant-committed measure 39) and enforce a 25-mph speed limit on private project access roads (applicant-committed measure 33), which would reduce the risk of direct mortality of pygmy rabbit from vehicle collisions.

Direct exposure to herbicides during project roadside maintenance is unlikely, but pygmy rabbits may come into contact with or consume vegetation that is contaminated with herbicide residue. Although BLM (2005) determined that the licensed use of pesticides and herbicides at a wind energy project would not adversely affect local wildlife (BLM 2005:5–68), small mammals such as pygmy rabbit may be at increased risk from incidental herbicide exposure. These species may use dense roadside vegetation for cover when moving across the landscape and the soft ground in recently disturbed areas can be an attractive location for them to construct a burrow. These newly disturbed sites and roadsides are also the areas where most herbicide applications are likely to occur because disturbance also increases susceptibility to invasion by and invasive weeds.

The potential effects of herbicide applications on terrestrial wildlife are identified and discussed in BLM (2007:4-114–4-118). BLM (2007) concluded that most herbicides authorized for use on BLM public land exhibit low acute and chronic toxicity for small mammals, though diquat, 2,4-D and diuron are moderately toxic to terrestrial wildlife, particularly under food ingestion scenarios. Thus, small mammals such as pygmy rabbit could be injured or killed by herbicide use. Three additional herbicides were approved for use in 2016, but BLM (2016b) concluded none of these herbicides posed toxicological risks to small mammals (BLM 2016b:4-61). Effects of herbicide use could persist beyond decommissioning if continuing herbicide treatments are necessary for successful reclamation.

MVE's applicant-committed measures to prevent the introduction or spread of nonnative plants (measures 100 through 112) would reduce the need for herbicide applications and the corresponding impacts to pygmy rabbit. Additionally, required mitigation measure Z would ensure that herbicides are properly applied, which would further reduce the potential impacts to pygmy rabbit. The results of project surveys for pygmy rabbit (WEST 2021c) indicate that the species is not prevalent in the analysis area and thus the number of individuals that may be affected would be relatively low. Preconstruction clearance surveys and avoidance of occupied habitat (described above) would further reduce the potential for pygmy rabbits to be affected by herbicide application. While Alternative B would likely involve more herbicide application than the other action alternatives (because it has the largest disturbance footprint and would require the most roads) the potential for effects to the species' populations from herbicide applications would be low.

Although unlikely to occur, ground disturbance and vegetation removal may crush or injure individual pygmy rabbits if present. Alternative B would have the largest ground disturbance footprint of the action alternatives and thus the highest potential for this effect to occur.

Summary

In summary, project ground-disturbance would further reduce, degrade, and fragment pygmy rabbit habitat in the analysis area. Although small mammal abundance and diversity may increase along new access roads, some research indicates that pygmy rabbits may avoid these and other disturbed areas. While vegetation along the shoulders of new access roads may facilitate the ability of small mammals such as pygmy rabbit to move parallel to the road, the increased risk of predation and collisions with vehicles would interfere with the ability of this species to move across these roads. Thus, the increase in road density would further fragment and degrade habitat in the analysis area and would increase the risk of injury or mortality to pygmy rabbit from increased vehicle traffic and exposure to herbicides.

Increased noise and human disturbance during construction may temporarily displace pygmy rabbits occupying habitats near active work sites. Individuals would likely recolonize these areas following construction. It is unlikely that pygmy rabbits would be substantially affected by noise from turbine operation, but some research indicates that pygmy rabbits may avoid these areas (Edgel et al. 2018; Germaine et al. 2020). However, based on surveys conducted for the project (WEST 2021c), it is unlikely that the siting corridors support large populations of pygmy rabbit. Preconstruction clearance surveys would be implemented in unsurveyed habitat, and occupied habitat would be avoided or individuals would be relocated. MVE's applicant-committed measures would reduce the potential impacts to pygmy rabbit but not eliminate them.

Alternative B would have the most ground disturbance and new roads in pygmy rabbit habitat and a higher traffic volume than Alternative D, Alternative E, and the Preferred Alternative (see Table 3.18-9). Therefore, Alternative B would have the greatest impacts on pygmy rabbit habitat.

Alternative B with Additional Measures

This section describes additional avoidance and minimization measures (not included in MVE's POD) that MVE would be required to implement under Alternative B. Although these measures are not included as part of Alternative B (MVE's Proposed Action), these measures would be included in the terms and conditions of the ROW permit if a ROW is granted and Alternative B is selected.

Additional project-specific mitigation measures for pygmy rabbit are summarized in Table 3.18-10 and detailed in Table App4-4 in EIS Appendix 4.

Table 3.18-10. Mitigation for Pygmy Rabbit

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
1	E	a
4	Z	u
12	–	nn
13	–	ddd
14	–	eee
17	–	fff

Applicant-Committed Measure	Mitigation Required by BLM Policy	Additional Project-Specific Mitigation Measure
33	–	–
39	–	–
95	–	–
100–112		

Note: All measures are detailed in EIS Appendix 4.

These additional measures would reduce impacts to pygmy rabbits and their habitat by requiring MVE's applicant-committed measures be applied throughout the life of the project (measure a). Requiring MVE to resurvey all potential pygmy rabbit habitat before construction and to avoid occupied burrows or develop additional mitigation where avoidance is not possible (additional measure eee) would ensure that impacts to any occupied burrows that were not identified during prior surveys are avoided or mitigated. Requiring modified transmission structure design and avian perch deterrents on collector and transmission lines within 0.3 mile of active recently active pygmy rabbit burrows (additional measure fff) would minimize the potential for increased predation of pygmy rabbits by raptors. Additional project-specific measures the BLM would require to reduce impacts related to weeds and nonnative plants (see Section 3.15.1.2 [Native Upland Vegetation Communities, Impacts]) would further reduce the potential for pygmy rabbit to be injured by herbicide applications. Implementing the additional ECMP requirements (measure nn) would ensure that all mitigation measures are followed and would improve reporting and adaptive management requirements which would further reduce impacts to pygmy rabbit. However, traffic volume under Alternative B with Additional Measures would be higher than any other action alternative because of the up-to-3-year construction phase. Overall, with the implementation of the BLM's additional measures, the potential for effects to this species is low.

3.18.4.2.3 ALTERNATIVE C (REDUCED WESTERN CORRIDORS)

The types and duration of effects from Alternative C would be similar to Alternative B, though the magnitude of effects would be slightly reduced. Alternative C would reduce or eliminate several of the westernmost siting corridors; however, little pygmy rabbit habitat is present in the siting corridors that were removed, and the total amount of ground disturbance and road construction in pygmy rabbit habitat would only be reduced by 18% relative to Alternative B. Traffic volume would also be nearly as high as under Alternative B with Additional Measures (see Table 3.18-9).

Alternative C would implement the same applicant-committed measures and other mitigation as Alternative B with Additional Measures, including preconstruction clearance surveys and avoidance of, or additional mitigation for, occupied burrows, thus direct impacts to pygmy rabbits would be unlikely. Alternative C would result in slightly fewer impacts to pygmy rabbit than Alternative B with Additional Measures but greater impacts than Alternative D, Alternative E, and the Preferred Alternative.

3.18.4.2.4 ALTERNATIVE D (CENTRALIZED CORRIDORS)

The types and duration of effects from Alternative D would be similar to Alternative B, though the magnitude of impacts would be greatly reduced. Alternative D would not only eliminate the same siting corridors as Alternative C, but it would also eliminate the majority of siting corridors east of Crestview Road to reduce development in areas that have higher sagebrush cover. Since pygmy rabbits depend on intact sagebrush steppe, this alternative would further minimize potential effects to pygmy rabbits in this area. Alternative D would have the least ground disturbance and fewest roads in pygmy rabbit habitat, as well as the lowest traffic volume of the action alternatives (see Table 3.18-9). Therefore, Alternative D would have the least impacts on pygmy rabbits and their habitat, though the potential for impacts under any action alternative is low.

3.18.4.2.5 ALTERNATIVE E (REDUCED SOUTHERN CORRIDORS)

The types and duration of effects from Alternative E would be similar to Alternative B, though the magnitude of impacts would be greatly reduced. Alternative E would not only eliminate the same siting corridors as Alternative C, but would also reduce or eliminate siting corridors west of Crestview Road and south of the existing WEC (see EIS Figure 2.4-1). Although the Alternative E siting corridors would be reduced by 40% when compared to Alternative B, this would only reduce ground disturbance in pygmy rabbit habitat by 27% in comparison to Alternative B because little pygmy rabbit habitat is present in the corridors that would be reduced or eliminated under Alternative E. Alternative E would also have a lower traffic volume than Alternatives B and C but a slightly greater traffic volume than Alternative D and the Preferred Alternative. Overall, of the action alternatives, Alternative E would have the second-fewest impacts to pygmy rabbits and their habitat, though the potential for impacts under any action alternative is low.

3.18.4.2.6 PREFERRED ALTERNATIVE

The types and duration of effects from the Preferred Alternative would be similar to Alternative B, though the magnitude of impacts would be greatly reduced. The siting corridors eliminated under the Preferred Alternative would be similar to those eliminated under Alternative E (see EIS Figure 2.4-1). Although this would result in the least total acreage of siting corridors of the action alternatives, little pygmy rabbit habitat is present in the corridors that would be reduced or eliminated under the Preferred Alternative. Therefore, ground disturbance in pygmy rabbit habitat would only be reduced by 28% in comparison to Alternative B. Traffic volume under the Preferred Alternative would be the second-lowest of the action alternatives. Overall, the Preferred Alternative would have fewer impacts on pygmy rabbits and their habitats than Alternatives B and C and greater impacts that Alternatives D and E, though the potential for impacts under any action alternative is low.

3.18.4.2.7 CUMULATIVE IMPACTS

As described in the affected environment above, approximately 90% of the analysis area is disturbed (contains roads and other development); is an existing ROW; has been converted to agriculture or rural residential; is dominated by nonnative vegetation; is proposed for other renewable energy development; or has been subject to wildfire, vegetation treatments, and seeding projects. These areas may no longer provide functional breeding habitat for pygmy rabbit. Alternative B would disturb 11% of the analysis area, which would further fragment and degrade the remaining pygmy rabbit habitat in the analysis area. Where project-related disturbance overlaps with areas that are disturbed by the existing and future trends described above, the project would contribute less to the overall cumulative effects. In areas that have not been previously disturbed, project disturbance would further reduce the limited amount of remaining pygmy rabbit habitat in the analysis area. These impacts would be exacerbated by the fragmentation this would cause, which may limit the ability of pygmy rabbit to use remaining habitat. While Alternative B would have a relatively small contribution to the overall impacts on pygmy rabbit habitat in the analysis area, it would have a larger contribution than any other action alternative.

Alternatives C, D, E, and the Preferred Alternative would each eliminate a different set of siting corridors, and all would decrease the amount of disturbance in pygmy rabbit habitat (i.e., they would require less ground disturbance, fewer access roads, and less vehicle traffic) to some degree. As such, each of these alternatives would have a smaller contribution to the cumulative effects on the pygmy rabbit and its habitat in the analysis area. The proportion of the analysis disturbed for each of these alternatives, which represents their relative contribution to cumulative effects, is as follows:

- Alternative C: 9%
- Alternative D: 6%
- Alternative E: 8%
- Preferred Alternative: 8%

Since all action alternatives include measures to identify and avoid occupied pygmy rabbit habitat or otherwise mitigate impacts, and because there are unlikely to be large populations of pygmy rabbits in the analysis area, it is unlikely that the project's contribution to cumulative effects to pygmy rabbits and their breeding habitat would lead to population-level effects or cause a trend toward federal listing.

3.18.4.3 Significance Determination

All action alternatives included measures (see Table 3.18-10) to identify and avoid occupied pygmy rabbit habitat or otherwise mitigate impacts, and because there are unlikely to be large populations of pygmy rabbits in the analysis area, it is unlikely that the project's contribution to effects to pygmy rabbits and their breeding habitat would lead to population-level effects or cause a trend toward listing under the ESA. No known pygmy rabbit populations occur in the analysis area, and identification and avoidance of active pygmy rabbit burrows prior to ground disturbance would minimize potential effects to pygmy rabbits. All action alternatives would disturb vegetation and increase human activity within potential pygmy rabbit habitat over the life of the project. Disturbance areas would receive interim reclamation and final reclamation to maintain and restore potential habitats. Although some areas would not be fully restored, the scale of these areas relative to other potential habitat would not result in significant impacts to habitat availability.

3.18.4.4 Irreversible and Irretrievable Commitments and Short-Term Uses Versus Long-Term Productivity

All action alternatives would have irretrievable impacts on pygmy rabbits through habitat alteration and loss (from work areas and infrastructure), disturbance and displacement (from noise, human presence, use of heavy equipment and machinery, vehicle use, vibrations, and shadow flicker caused by moving blades), and injury or mortality (vehicle strikes and application of herbicides or pesticides). Habitat alteration and loss would last up to 84 to 86 years—which would comprise the life of the project (the time period encompassing construction through decommissioning, which would be 34 years for Alternative B and at least 36 years for the other action alternatives) and 50 years for vegetation to reestablish after final reclamation)—but would not be irreversible because most areas would be reclaimed and restored in the long term. Disturbance and displacement and injury or mortality effects would occur during the life of the project but would not be considered irreversible because they would be unlikely to result in a trend toward listing under the ESA. Irreversible effects would occur post-project in areas where very fragile soils are disturbed and reclamation potential is limited, where concrete foundations remain following decommissioning, and where the BLM may choose to leave roads in place, resulting in up to 401 acres of permanent pygmy rabbit habitat loss under Alternative B and 271 acres under the Preferred Alternative.

3.19 MINIDOKA NATIONAL HISTORIC SITE INTERPRETIVE PURPOSE (SEE MAIN EIS)