Department of Energy
Idaho Operations Office
1955 Fremont Avenue
Idaho Falls, ID 83415

May 21, 2019

Dear Citizen:

Pursuant to 10 CFR 1021.321, the U.S. Department of Energy (DOE) has prepared the *Draft Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory (DOE/EA-2097).* The draft environmental assessment provides DOE's analysis of the proposed expansion which would include construction and operation of 16.5 miles of overhead power line to provide additional capabilities for electrical grid testing. This new overhead line will be placed alongside an existing transmission line at the 890-square-mile Idaho National Laboratory (INL) site. DOE prepared this draft environmental assessment to determine whether an environmental impact statement should be prepared for this action, or that no further National Environmental Policy Act (NEPA) documentation is required.

The draft environmental assessment and existing NEPA documents referenced in the draft environmental assessment are available at the following web link: http://www.id.energy.gov/insideNEID/PublicInvolvement.htm.

The draft environmental assessment has been issued for a 30-day public comment period. Comments received after the 30-day public comment period will be considered to the extent practicable. Comments are due to DOE on or before June 21, 2019. Comments can be submitted to Jim Jardine, U.S. Department of Energy, Idaho Operations Office, 1955 Fremont Avenue, Idaho Falls, Idaho, 83415-1222 or by email at pgtb@id.doe.gov. A paper copy of the draft environmental assessment can be requested at pgtb@id.doe.gov.

Sincerely,

Robert Boston
Manager

DOE/EA-2097

U.S. Department of Energy
Idaho Operations Office

Draft Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory

Draft

May 2019

Idaho National Laboratory

DOE/ID-2097

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Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

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SUMMARY

This National Environmental Policy Act Environmental Assessment (EA) evaluates the potential environmental impacts of expanding capabilities at the Power Grid Test Bed at the Idaho National Laboratory (INL) Site. Expansion activities include (1) installing a new 138-kilovolt overhead power line from the Central Facilities Area through the Critical Infrastructure Test Range Complex to the Materials and Fuels Complex; (2) increasing the size of the fenced area at the Scoville substation; and (3) enlarging old and establishing new test pads for expanded testing, and (4) expanding authorized uses of the Haul Road. This EA assesses the environmental effects of the proposed action and a no action alternative.

Under the no action alternative there would be no changes made to the existing electrical power supply system.

Potential impacts to human health and the environment are anticipated to be minimal for the proposed action. The power line would contrast and be visible against the skyline from some public areas. Pole structures and materials would be selected to mitigate visual effects. About 400 acres would be disturbed during construction, with 227 of those acres considered permanent use. Disturbed areas not needed for operations and maintenance would be restored. Possible adverse effects to sensitive species or habitat are not expected due to the proposed placement of structures, roads, and laydown areas along existing roadways and distribution lines or in disturbed areas. Potential adverse effects could occur to five cultural resource sites. Timing of actions to avoid adverse effects to sensitive species or their habitats and other project requirements would be enforced during construction and maintenance activities. The cumulative effects of the proposed action along with past, present, and reasonably foreseeable actions on the INL Site are anticipated to be negligible.

CONTENTS

FIGURES

TABLES

ACRONYMS

ACHP	Advisory Council on Historic Preservation
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
ARA	Auxiliary Reactor Area
CCA	Candidate Conservation Agreement
CEQ	Council on Environmental Quality
CFA	Central Facilities Area
CITRC	Critical Infrastructure Test Range Complex
CFR	Code of Federal Regulations
CRMO	Cultural Resource Management Office
DOE	Department of Energy
DOE-ID	DOE Idaho Operations Office
EA	Environmental Assessment
EMF	Electromagnetic Frequency
EPA	Environmental Protection Agency
ESER	Environmental Surveillance, Education, and Research
IML	Intermediate Measurement Location
INL	Idaho National Laboratory
kV	kilovolt
MFC	Materials and Fuels Complex
MRI	Midwest Research Institute
NEI	National Emission Inventory
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NPG	Naval Proving Ground
NRHP	National Register of Historic Places
NSTR	National Security Test Range
OHL	Overhead Power Line
PBF	Power Burst Facility
PGTB	Power Grid Test Bed
PSD	Prevention of Significant Deterioration
R&D	Research and Development
RRTR	Radiological Response Training Range
SHPO	State Historic Preservation Office
USC	United States Code
USFWS	United States Fish and Wildlife Service
VOC	Volatile Organic Compounds

Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory

1. INTRODUCTION

The National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] § 4321 et seq.) requires federal agencies to consider the environmental consequences of proposed actions before decisions are made. To comply with NEPA, the U.S. Department of Energy (DOE) follows the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508) and DOE's NEPA implementing procedures (10 CFR 1021). The purpose of an environmental assessment (EA) is to give federal decision makers evidence and analysis for determining whether to prepare an environmental impact statement or issue a finding of no significant impact. In this EA, DOE evaluates expanding infrastructure and constructing, operating, and performing testing to support protecting national infrastructure on a 16.5-mile, 138- kilovolt (kV) overhead power line (OHL) from the Central Facilities Area (CFA) to the Materials and Fuels Complex (MFC) at the Idaho National Laboratory (INL) Site Power Grid Test Bed (PGTB).

The new OHL supplies an isolated 138-kV transmission line for research and development (R&D) aimed at advancing the reliability, resilience, and security of the national power grid and critical infrastructure. The proposed route follows an established 138-kV OHL and power line access road when possible, and new infrastructure is collocated with existing development to the extent possible. Figure 1 depicts the general location of the proposed power line on the INL Site.

The goal of NEPA and this EA is to enable DOE decision-making based on an understanding of environmental consequences. This EA supplies DOE environmental information to (1) evaluate impacts to human health and the environment and (2) develop project controls to minimize or avoid adverse effects to human environmental integrity and natural ecosystems if DOE decides to construct and operate the new OHL and expand PGTB.

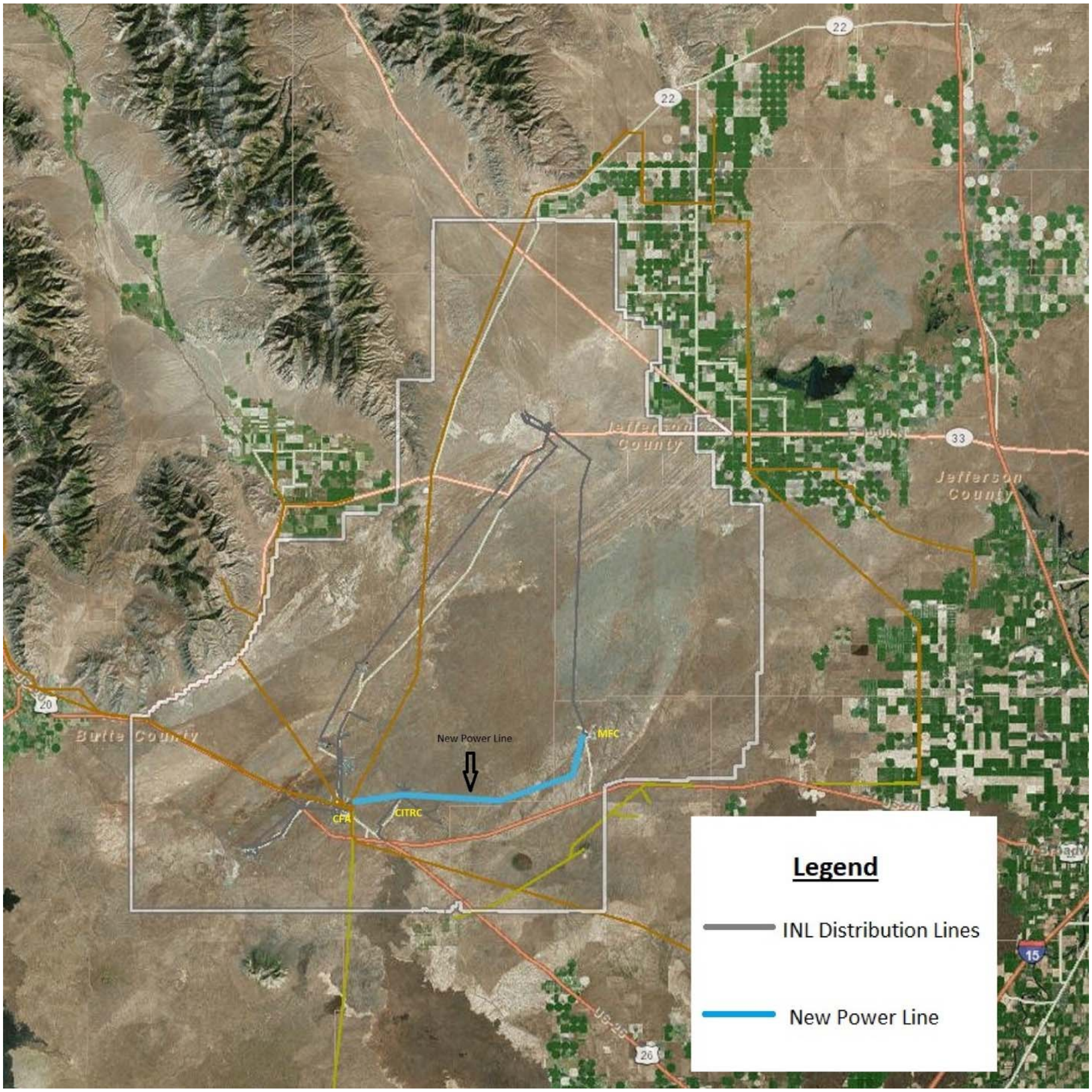

Figure 1. Configuration of PGTB at the INL Site.

1.1 Background

The INL Site contains 61 miles of 65-megawatt, 138-kV rated electrical power transmission, which supplies seven main substations, each feeding a separate facility complex within the 890-square mile INL Site. Three commercial utilities own power distribution infrastructure on the INL Site. The INL Site grid operates independent from commercial utilities through a primary substation and command and control center. Government and industry entities research, develop, demonstrate, and validate modern grid technologies using PGTB, which offers a full-scale utility test bed operating on part of the INL Site power grid.

The PGTB facilities at the Critical Infrastructure Test Range Complex (CITRC) include a controllable substation and 13.8-kV distribution network. The CITRC area also contains four smart grid user locations (i.e., test pads) on a distribution mesh capable of operating with stand-alone portions of the mesh or in concert with other parts of the mesh to support larger operations at multiple voltage levels. The mesh distribution system was completed in 2017 and added about 7.41 miles of power lines to PGTB. The mesh distribution project disturbed about 180 acres at the INL Site.

Patchable fiber-optic communications cables at each test pad support communication between the test pads and command shelter.

PGTB also incorporates the CFA Scoville Substation, the CITRC Substation, OHLs from CFA to MFC, the distribution mesh grid at CITRC, and additional test pads at the Auxiliary Reactor Area (ARA), CITRC substation, Intermediate Measurement Location (IML), MFC, and Obsidian. The five PGTB test pads outside the mesh distribution system at CITRC occupy about 21 acres (INL, 2019). These test pad locations are shown in Figure 2. The four test pads that are part of the mesh distribution system at CITRC take up about an acre (i.e., 0.25 acres each) and are too small to show in Figure 2.

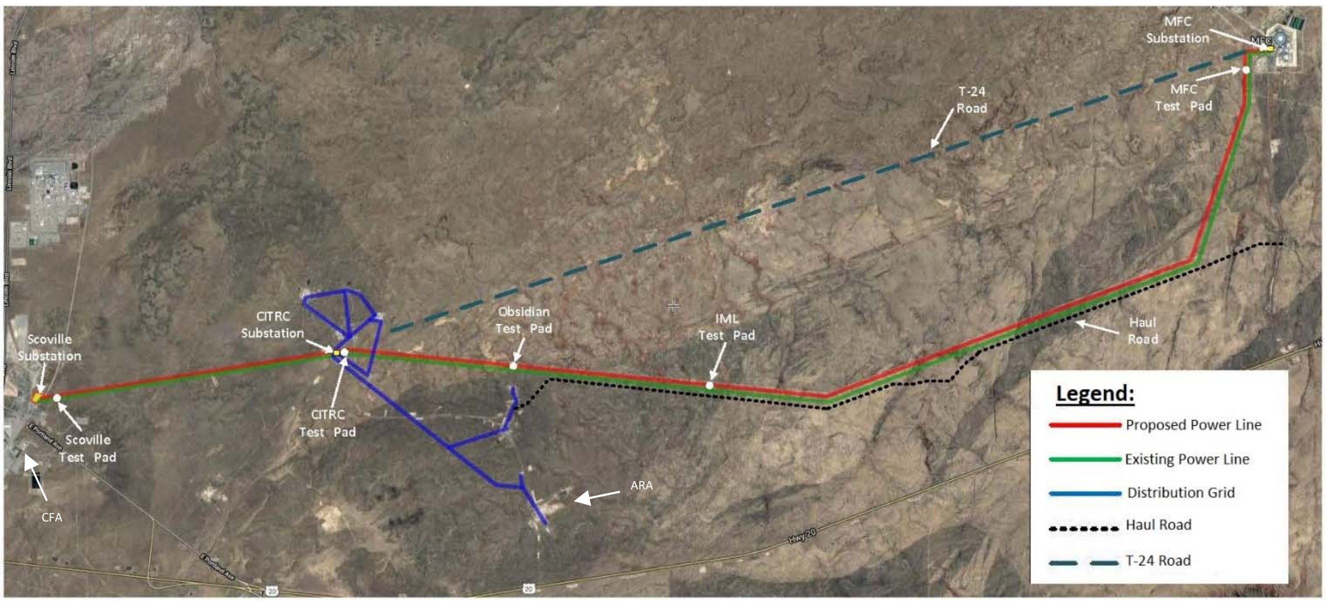

Figure 2. Configuration of PGTB at the INL Site.

Graveled test pad size varies from about 14,000 to about 73,000 ft^2, while the disturbed area around each for parking and other test support activities is larger. Test pads furnish areas to place test equipment (e.g., transformers, circuit breakers, switches, etc.). Some testing uses multiple test pads. Table 1 lists PGTB components and size.

Table 1. PGTB testing location size.

Area of Disturbance	Size (acres)
ARA Test Pad	0.4
CITRC Test Pad	7.8
Distribution Mesh Test Pads	1
Distribution Mesh Power Lines	180
IML Test Pad	10
MFC Test Pad	0.4
Obsidian Test Pad	1.7
TOTAL	**201.3**

Typical PGTB power grid test scenarios include integrating new and old systems, automatic restoration and self-healing, distributed generation, demand response, and micro-grid technology.

The Multipurpose Haul Road (hereafter referred to as the “Haul Road”) and T-25 power line access road are the main roads between CITRC and MFC in the project area. A road priority system for managing roads at the desert site applies to all roads within the administrative boundaries of the INL Site. The road priority system assigns a priority, from 1 to 4, that designates the use and maintenance allowed for each road. The priority definitions are as follows:

- Priority 1: Emergency evacuation roads and security roads that are routinely graveled and graded
- Priority 2: Project access roads that are maintained as passable and occasionally graveled and spot graded
- Priority 3: Wildland fire access roads maintained as passable, but grading is not permitted
- Priority 4: Two-track roads that are only visible due to sporadic use and no maintenance is permitted.

The Haul Road is a Priority 2 road, with special use conditions that only allow access for maintenance and transferring research fuel, spent fuel, special nuclear materials, and test or experiment materials between MFC and other areas of the INL Site. The *Environmental Assessment for the Multipurpose Haul Road Within the Idaho National Laboratory Site and FONSI* (DOE-ID, 2010) evaluated the environmental impacts of constructing and using the Haul Road.

The T-25 road serves as the main transportation route between CITRC and MFC for PGTB due to Haul Road use limitations. T-25 has a Priority 3 designation throughout the project area.

1.2 Purpose and Need for Action

Modern power grid infrastructure faces diverse challenges. Reliable and economic operation of the nation’s power grid requires that new technologies, methods, and devices be developed and validated to strengthen and maintain secure, functioning, and resilient critical infrastructure, including assets, networks, and systems, that are vital to national security and well-being. Integrating cybersecurity, industrial control systems, wireless communications, and electric power grid technologies requires research, development, testing, and deployment of unique technologies and methodologies that advance the reliability, resilience, and security of the national power grid and critical infrastructure. The purpose of the proposed action is to support these current and future needs at the INL Site PGTB by dedicating grid infrastructure to R&D of grid protection technologies. Expanding PGTB enables full-scale testing and evaluation of evolving grid distribution systems, technologies, and components needed for a secure and resilient national power grid.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

The CEQ regulations in 40 CFR 1508.9(b) require that an EA include a brief discussion of alternatives to a proposed action. This section describes the proposed action, the no action alternative, and alternatives considered but eliminated from further analysis.

The DOE Idaho Operations Office (DOE-ID) considered action alternatives to meet the need to research, develop, test, and deploy technologies and methodologies at PGTB for protecting the national power grid and critical infrastructure. For the action alternatives to be feasible, they must accomplish the following:

- Allocate infrastructure to enable full-scale testing and evaluation of evolving grid distribution systems and technologies at PGTB
- Support R&D advancing the reliability, resilience, and security of the national power grid and critical infrastructure

- Maintain a reliable power supply to INL Site facilities during PGTB R&D tests.

2.1 Proposed Action

The proposed action enhances PGTB capabilities by enabling testing on a dedicated power line without disabling the INL Site power transmission loop; the new reconfigurable 138-kV transmission line creates a multi-utility type interconnected grid to allow simultaneous testing of loads, generation, and storage. The proposed action allows PGTB users to test and operate at higher distribution voltages and to simulate operational conditions at scale.

The proposed action (1) constructs a 138-kV power line, equipment laydown areas for construction, and one new test pad for research; (2) expands existing test pads to accommodate parking areas and defensible space; (3) expands the CITRC substation to allow new power infrastructure tie-ins, and (4) expands authorized uses of the Haul Road. The proposed 138-kV OHL is about 16.5 miles long and connects to the Scoville Substation at CFA, routes through the CITRC area, and ends at MFC. Post-construction activities involve power line testing activities on the new OHL, routine and emergency maintenance, and access road upgrades. These activities have the potential to impact about 983 acres at the INL Site (Holmer, Henrikson, & Olson, 2019). Appendix A gives a detailed description of construction activities.

Figure 3 depicts the route of the proposed OHL.

Construction requires clearing and grubbing vegetation, backfilling with pit-run gravel, installing ground grids, placing substation gravel base, and installing fencing. It also includes enlarging established test pads, installing fiber optic cable on the new poles, and locating equipment laydown areas and construction parking areas in disturbed areas or as close as possible to disturbed areas and the construction work. Figure 4 shows previously disturbed areas preferred for locating parking and laydown areas. Appendix B shows each preferred location in more detail.

The old and new power lines both support testing activities, and the new OHL also supplies power to INL Site facilities. Testing uses equipment such as diesel generators, transformers, circuit breakers, switchgear, load banks, instrumentation, and battery trailers installed at test pads on a temporary basis.

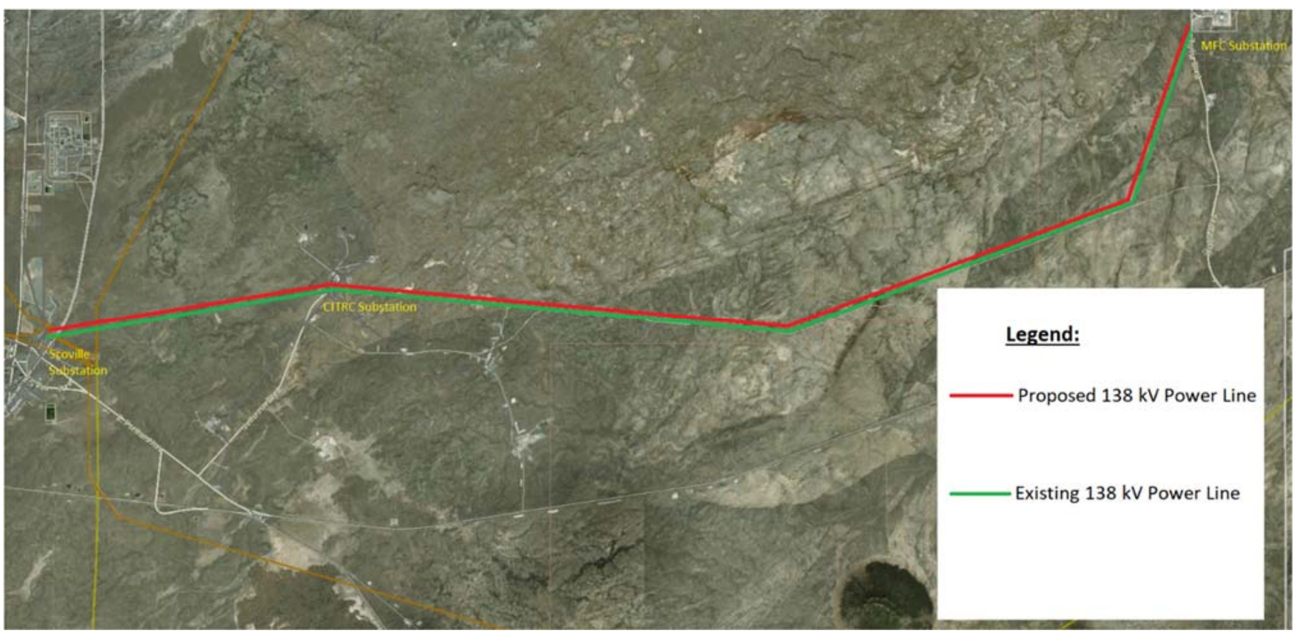

Figure 3. Proposed new OHL route for PGTB.

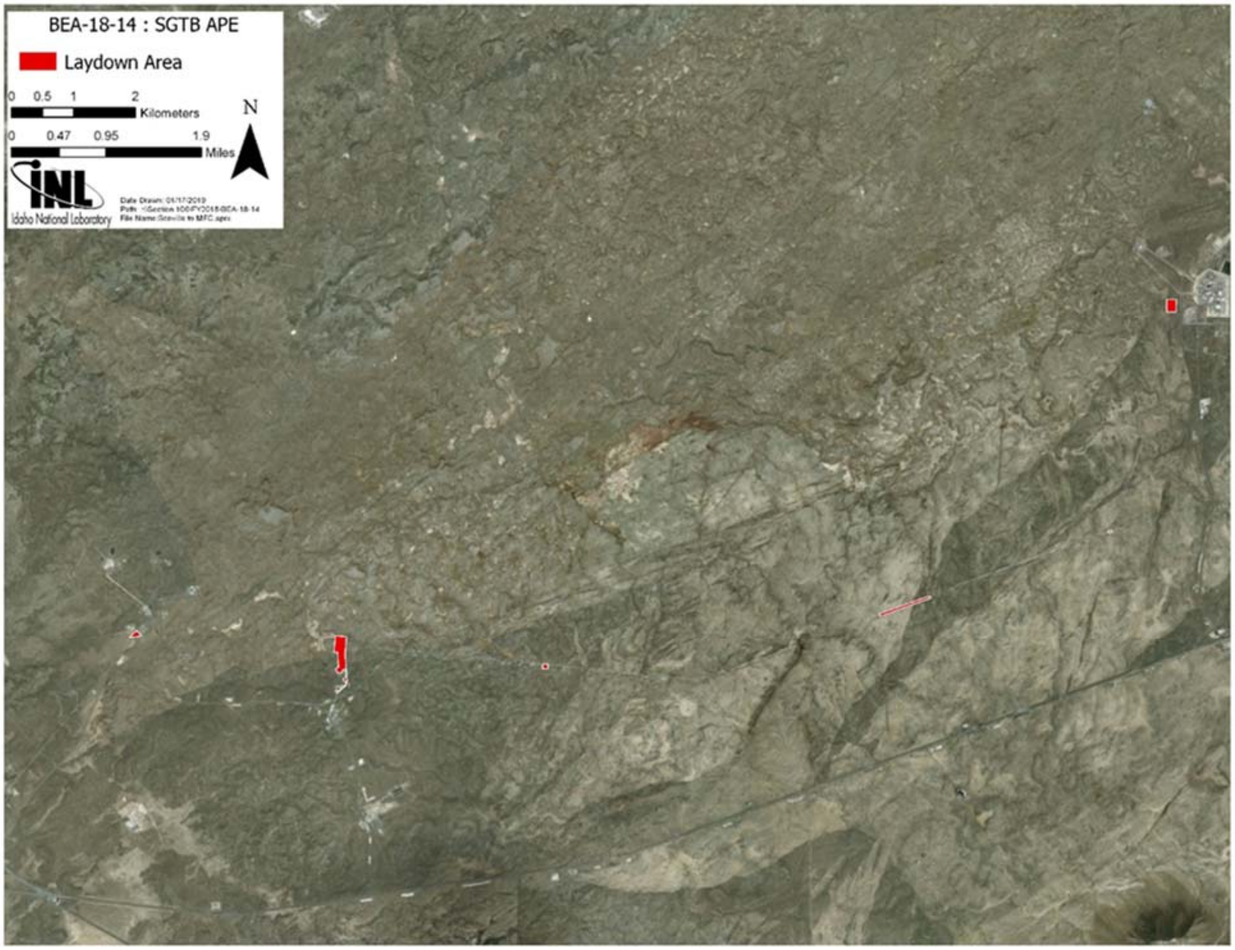

Figure 4. Preferred laydown and parking areas.

The proposed action also upgrades the T-25 road between CITRC and MFC to a Priority 2 road to allow road grading and improved road maintenance to address seasonal hazards that inhibit travel and access to portions of PGTB. In addition, the proposed action allows use of the Haul Road for activities that were not considered in the Haul Road EA (DOE-ID, 2010), such as transporting construction materials for the new OHL and moving sensitive R&D equipment or explosives for security purposes when other roads are too rough. Other examples include transporting large items (such as cranes) to the National Security Test Range (NSTR) north of MFC and decommissioning and demolition waste from MFC to the CFA landfill or excess yard. Typically, uses would only be authorized if transportation using alternative routes presents safety hazards, such as transporting wide and heavy loads on Highway 20. New use of the Haul Road will not interfere with shipments for which the road was originally intended, (i.e., transferring research fuel, spent fuel, special nuclear materials, and test or experiment materials between MFC and other areas of the INL Site). The proposed action prohibits using the Haul Road for personal or government passenger vehicle travel between sites or for mere convenience.

2.1.1 Power Line Design

A majority of the proposed OHL would be constructed from about 300 single, raptor-safe, ductile iron poles. Pole spacing is about 300 ft. However, there are possible exceptions due to engineering and site conditions, such as using wood-pole H-frame structures for increases in span length. Ductile iron poles require less maintenance than wooden power poles due to resistance to rot, insects, and fire. For embedded protection, a ceramic epoxy coats the pole bottoms to prevent pole constituents leaching to soil.

2.1.2 Power Line Construction

This section describes typical construction methods for OHLs, substation modifications, and temporary construction work areas. The process for bringing personnel, materials, and equipment to each power pole site, installing the foundation, erecting the support structure, and stringing the conductors can vary at each segment or at any structure site. However, the following subsections provide the general methods used to construct an OHL.

2.1.2.1 Access to Pole Sites. Prior to construction, crews stake and flag the OHL corridor (measuring about 100 ft out from each side of center) and mark each structure location. The Haul Road and T-25 power line road, adjacent to portions of the new OHL corridor, give access to most new pole locations. Passenger vehicles park in clearly marked and designated parking areas located in previously disturbed areas.

Constructing the proposed power line requires driving from pole to pole to install the new poles and lines. In areas where accessing new pole locations cannot be accomplished by driving a straight line from the previous location, crews access the next location by returning to the nearest road.

Off-road vehicle access along the 16.5 miles of OHL route disturbs about 400 acres of land (200 ft wide or 100 ft each side of center line) on the INL Site (16.5 miles = 87,120 ft x 200 ft wide = 17,424,000 ft^2 = 400 acres). Because the route follows the established 138-kV OHL with about 125-ft offset, some of the area has been previously disturbed. An area about 200 ft around each pole will be permanently disturbed for pole installation and future maintenance. The remaining area between poles is considered temporary disturbance and will be revegetated.

In addition, the proposed action has the potential to create about 7 miles of temporary spur routes (assuming a 125-ft offset from the existing line or nearest road to each of the 300 new pole locations) for equipment turn arounds and to access pole sites. Crews blade or mow spur routes measuring about 14 ft in width, which also has the potential to disturb an additional 12 acres. Exact locations for spur routes cannot be defined until final project design. However, the amount of potential disturbance is conservative, because it assumes each pole requires a new 125-ft × 14-ft spur route, while the project anticipates most poles can be installed from established roads and equipment can turn around in the 200-ft radius area of disturbance around each pole.

2.1.2.2 Installing Poles. Prior to installing poles, crews clear vegetation at each site. Construction crews install poles on a priority basis rather than in sequential order. The construction sequence may be altered due to weather, wildlife timing restrictions, or other factors. Backhoes, track hoes, or augers excavate holes for pole embedment. The proposed action does not include blasting. Rock drills bore holes in rock where necessary. Crews direct-bury the ductile iron poles and, in some cases, installing poles may require placing reinforcing steel or an anchor bolt cage in pole foundations. Typical structure installation at each pole location involves short-term surface disturbance of an area about 200 ft in diameter around each structure.

A permanent change in the type of vegetation around each pole is anticipated from continued disturbance associated with future pole maintenance. The permanent changes occupy an area measuring about 31,416-ft^2 with the pole in the center. Total permanent disturbance associated with the presence of 300 poles would be about 216 acres.

2.1.2.3 Pole Erection. Construction crews use ground equipment to erect poles. Semi-trucks deliver poles to each site and crews assemble poles onsite using a small, truck-mounted crane or boom truck. Rubber-tired or track vehicles haul structural components (e.g., poles, insulators, hardware, etc.) to the pole locations; the vehicle used depends on the type of equipment needed, type of access available, and local site conditions.

2.1.2.4 Pull and Tension Sites and Reel Sites. When structures are in place, crews string conductors by laying a pulling line, or sock line, along the route using a light vehicle (where there is vehicle access within the corridor) or by hand. Ground crews place the sock line in pulleys on each structure at the conductor location.

Installing the OHL requires about five distinct pull and reel sites (not including locations where crews use substations or structure sites for stringing) to aid stringing the conductor. Final project design determines the location of pull and reel sites within the OHL corridor; however, in general, power line construction requires pull and tension sites every 1 to 4 miles. The size of a pull and tension site varies with space availability, but 800 ft by 100 ft is typical. In general, OHL construction locates reel sites (also about 800 ft by 100 ft in size) opposite pull and tension sites.

The proposed action locates pull and tension and reel sites within already disturbed areas when possible (see Appendix B). Final design may require locating some sites at undisturbed locations. Depending on topography, some pull and tension sites may require minor grading to create level equipment work areas. Pulling and reeling stations disturb about 9.2 acres total if all are in undisturbed areas. These pulling stations would also be used as parking and turn-around pads during construction.

2.1.2.5 Construction Equipment and Personnel. Constructing the new OHL requires about 20 people per day. Line crews string the conductor, ground crews work on OHL pole construction and preparation for stringing, and grading crews prepare the pole sites.

Equipment and vehicle types include pickup trucks, bucket trucks, rubber-tired or track-mounted augers, cranes, flatbed reel trucks, off highway vehicles, and tractor trailers. Construction includes three to seven vehicles in or around pole location sites or in the OHL corridor at any time.

Diesel fuel, gasoline, engine oil, hydraulic oil, and antifreeze in mobile equipment are the only hazardous material liquids proposed for use during construction and maintenance. No toxic or hazardous substances would be stored in the OHL corridor or generated during maintenance. Toxic or hazardous substances used in conjunction with the project would be stored at CFA and an equipment laydown area.

2.1.3 Test Pad Construction and Expansion

Constructing test pads clears, grubs, and backfills the test pad with pit run gravel. Construction installs a ground grid and finishes the pad with crushed gravel. Figure 2 depicts test pad locations along the proposed OHL route. The proposed action constructs the Scoville Test Pad and expands the existing test pads at CITRC and IML; gravels and fences the existing CITRC, IML, and MFC test pads; and designates parking locations at each. The proposed action also installs an additional power pole at the CITRC test pad.

The proposed new Scoville test pad measures about 100 ft × 100 ft (10,000 ft^2). However, the size increases when adding defensible space for fire protection. Assuming defensible space around each test pad measures 50-ft wide, the footprint increases to about 22,500 ft^2. The action also includes expanding the existing CITRC and IML test pads in previously disturbed areas. Fencing the CITRC, IML, and MFC test pads and designating parking at each pad limits unauthorized expansion of disturbed areas.

2.1.4 Substation Expansion

The new line requires expanding the Scoville substation and modifying the bus to allow the test line to be isolated from the rest of the system. This requires expanding the ground grid, extending the bus to the north, and positioning a new bay for the new production line. The proposed action also adds controls inside the substation control building. The proposed expansion occurs within the CFA facility boundary on previously disturbed ground.

2.1.4.1 Yard Modifications. The proposed action extends the Scoville substation yard northeast to create room for constructing a new termination point (i.e., bay) to connect the new OHL to the east bus. The existing 138-kV line to CITRC exits Scoville at an angle, which also requires extending the busses. Yard modifications include expanding the substation ground grid and fence.

2.1.4.2 Scoville Substation One-Line. As previously noted, Appendix A details proposed construction and modifications, including the Scoville Substation one-line. The proposed action moves the existing 138-kV line from Scoville to CITRC to the west bus, moves several bus jumpers, and modifies control circuitry. The modification requires moving currents and trips and installs new line potential transformers.

2.1.4.3 Scoville Substation Control Room Additions. The proposed action locates control equipment in the control building (i.e., CF-681) and protection and control equipment in the vertical section lineup in the main dispatch arena. The remote terminal unit has spare points for control without upgrades.

Project activities modify the mimic board to add the new line and relocate the CITRC line.

2.1.4.4 Duct Bank Installation. Substation expansion includes grading and above grade and below grade construction. Crews install power conductors above ground and communication cables above ground in cable trays or route the cables underground in small duct banks to connect to substation communication systems.

Following trenching, personnel install cable conduits (separated by spacers) and pour concrete around the conduits to form the duct banks. Typical duct banks are about 3 ft wide by 4 ft deep. Following conduit installation, crews fill the remaining trench with engineered backfill.

2.1.4.5 Cable Pulling, Splicing, and Termination. After installing conduit, crews run cable in the duct banks by pulling each cable segment into the duct bank, splicing cables at each vault, and terminating cables where the line converts to an overhead conductor. All vaults are above ground. To pull the cable through the ducts, personnel place a cable reel at one end of the section and a pulling rig at the other. A splice trailer facilitates cable splicing after the cables are pulled through the ducts. At each end of the underground segment, the cables rise out of the ground and terminate on equipment within the transition station or substation.

2.1.5 Site Cleanup

The proposed action restores disturbed areas (including pull sites, reel sites, structure removal sites, and staging areas) to near preconstruction conditions following construction. Restoration includes grading and restoring sites to original contours and active revegetation using native seed as described in Section 4.1.1.8. In addition, the project removes construction materials and debris and recycles or disposes the materials as appropriate.

2.1.6 Permanent Land Use

The proposed action has the potential to impact about 983 acres at the INL Site, but less than half of that would be directly disturbed. The OHL corridor measures 100 ft either side of center and covers about 400 acres. Pole installation and maintenance has the potential to disturb about 216 acres inside the OHL corridor. The remaining 184 acres within the OHL corridor disturbed during construction will be rehabilitated as described in section 4.1.1.8. Upgrading the T-25 road from a Priority 3 to a Priority 2 road would result in the road being widened from about 20 ft (40 acres of total disturbance along the 16.5-mile OHL) to about 25 ft wide (50 acres of total disturbance along the 16.5-mile OHL route), which adds about 10 acres to the road area. Table 2 summarizes the potential acres of disturbance associated with the proposed action.

Table 2. Summary of potential surface disturbance from implementing the proposed action.

Area of Disturbance	Size (acres)
Total Project Area[a]	983
OHL Corridor	400
Power Pole Installation and Maintenance	216 (within the OHL corridor)
Spur Routes	12
Road Upgrades	10
Pulling and Tensioning Sites	9.2
Test Pad Construction and Expansion	0.5

a. All disturbance is within the 983-acre project area, but the entire area is not disturbed.

The proposed action requires about 227 acres of new permanent use in the project area. Table 3 lists acres of new permanent use in the proposed action.

Table 3. Acres of proposed permanent use.

New Use Area	Size (acres)
New OHL and Maintenance Area	216
Road Improvements	10
Test Pads	0.5
TOTAL	**226.5**

2.1.7 Power Line Operations and Testing

Future testing on the new and reconfigured test beds may include temporary installation of diesel generators, 138/13.8-kV transformers, SF_6 gas-filled circuit breakers, switchgear, load banks, instrumentation, and battery trailers. This temporary arrangement allows user reconfiguration for different test scenarios. Test equipment includes, but is not limited to, the following:

- Portable gas or diesel generators, ranging from 1,000 watts to about 2.5 megawatt
- Power transformers from 480 V to 138/13.8 kV
- Circuit breakers, switchgear, load banks, instruments, and battery trailers
- Temporary low and medium voltage (up to 35-kV class) electrical cables and communications fiber and cable installed on pole structures, on the ground, or in facilities
- Temporary control shelters and equipment trailers
- Automotive batteries (12-volt sealed lead-acid) for remote power.

Testing usually includes up to about eight test cycles (2 to 3 weeks in duration) starting in May and continuing periodically through the end of September. The total diesel generator maximum power rating would be about 3 to 4 megawatts and would operate 2 to 4 hours per day during the testing periods (eight test periods x 21 days x 4 hours/day) for about 672 hours total operation per year. The generator(s) would be operated at near 80% of the rated load. Small (i.e., less than 10 KW) generators may be used to power portable equipment at the test pads. Large diesel generators would be mounted on wheels or skids.

Testing activities involve up to 30 people and numerous vehicles at PGTB. Testing includes defining research questions and test objectives, developing test articles, setting up and calibrating test instruments, performing tests, analyzing results, and using results to develop future experiment objectives. Testing activities involve power management operations and maintenance and placing sensors and measuring equipment around substations, on or around power lines, and in or around facilities and buildings. Testing includes the following:

- Accessing test locations using established roads
- Placing equipment per test requirements
- Removing test and support equipment following testing
- Monitoring unmanned equipment on a periodic basis.

Installing temporary antennas, cable, and other equipment has the potential to disturb soils on test pads. Some testing places equipment, instruments, and sensors on the ground or in holes at the test pad. Holes measure about 12 to 36 in. in diameter and are refilled after testing.

Tests have potential to cause (a) a power line to fail, (b) a short to ground, (c) a phase to phase short, (d) exploding electrical gear, or (e) a combination of these or similar events. Testing also has the potential to cause other equipment attached or associated with the power grid to fail. Methods to reduce fire risk are discussed in section 4.1.1.3.

2.1.8 Power Line Maintenance

Maintenance and inspection on power poles and structures includes replacing poles and structures in poor condition and inspecting and replacing other components (e.g., anchors, insulators, cross-arms, wire, etc.). Routine power line maintenance activities impact an area having about a 100-ft diameter around poles and support structures. Driving pole to pole is not authorized for maintenance activities and crews are restricted to using the T-25 power line access road. Vegetation disturbance from vehicle traffic is expected in the area around poles and support structures and in limited circumstances where direct-line travel from a road to a power pole or structure is required to complete routine maintenance activities.

The maintenance required for ductile iron poles is anticipated to be reduced compared to wooden power poles based on information from similar power lines around the United States. The lower anticipated maintenance limits the amount of traffic needed at each pole location after construction is complete.

2.2 No Action Alternative

The no action alternative describes existing conditions and serves as a baseline for comparing the potential environmental effects of the proposed action. Under the no action alternative, a new power line originating at Scoville and ending at MFC would not be constructed. No land clearing or installation of power line components for this purpose would occur at the INL Site. Any potential environmental effects along the proposed power line would not occur. Testing activities, road use, maintenance, and other land in the project area would also remain unchanged. The potential benefit of reliability in electrical power supply from a new power line for current and future MFC operations would not occur.

2.3 Alternatives Eliminated from Detailed Analysis

During development of alternatives for the project, one alternative to the proposed action was explored, which was adding a new power line and test area along the T-24 Road. The T-24 alternative is discussed in the following subsection.

2.3.1 New Power Line and Test Area along the T-24 Road

The T-24 road route is located north of the T-25 power line access road and south of the T-3 road. The T-24 route is an inactive road about 12 miles long that consists of a two-track, four-wheel-drive trail described as very rough. This alternative requires substantial upgrade of the T-24 road and considerable rock removal, cutting, filling, compaction, and grading. Resource investigations along T-24 have not been as comprehensive as along T-25 and the road remains a primitive two-track trail with no modern developments. Because few resource investigations have been conducted along T-24 and the area remains largely undisturbed, impacts associated with this alternative were determined to be comparatively higher than those anticipated along T-25. Resource concerns also may be elevated in the undisturbed desert through which T-24 passes. For these reasons, the alternative of constructing a new OHL along T-24 was considered but, ultimately, eliminated from further analysis.

3. AFFECTED ENVIRONMENT

This section describes the area potentially impacted by the proposed action as required by CEQ regulations. The extent of the affected environment may not be the same for potentially affected resource areas. Discussion of the present day setting in this document is limited to environmental information that relates to the scope of the proposed action and alternatives analyzed.

The INL Site contains several facilities, each occupying less than 2 square miles, and covers about 890 square miles of otherwise undeveloped, cool desert terrain. DOE controls INL Site land, which is in portions of five southeastern Idaho counties: Bingham, Bonneville, Butte, Clark, and Jefferson. Population centers in the region include the cities (more than 10,000 people) of Blackfoot, Idaho Falls, Pocatello, and Rexburg. Several smaller cities and communities (less than 10,000 people), including Arco, Atomic City, Fort Hall Indian Reservation, Howe, and Mud Lake, are located around the site less than 30 miles away. Craters of the Moon National Monument is less than 20 miles to the west of the INL Site; Yellowstone and Grand Teton National Parks and the city of Jackson, Wyoming are located more than 70 miles northeast of the INL Site, and Sun Valley ski resort lies less than 70 miles to the west.

The land adjacent to the INL Site boundary consists of public and private land. The U.S. Bureau of Land Management manages about 75% of land adjacent to the INL Site; their lands support wildlife habitat, mineral and energy production, grazing, and recreation. The State of Idaho owns about 1% of adjacent land that supports uses like those on federal land. The remaining 24% of land adjacent to the INL Site is private land, with grazing and crop production as the most common uses.

Specific recreational and tourism areas near the INL Site include the Birch Creek Camping Area, Black Canyon Wilderness Study Area, Camas National Wildlife Refuge, Craters of the Moon National Monument, Hell's Half-Acre Wilderness Study Area, Market Lake State Wildlife Management Area, and Mud Lake Wildlife Management Area. Two national forests, the Salmon-Challis and Caribou-Targhee, also lie within 50 miles of the INL Site. Populations potentially affected by INL Site activities include INL Site employees, ranchers grazing livestock in areas on or near the INL Site, hunters on or near the INL Site, residential populations in neighboring communities, travelers on public highways, and visitors at the Experimental Breeder Reactor-I National Historic Landmark. No permanent residents are located on the INL Site.

No prime or unique farmland protected by the Farmland Protection Policy Act occurs on the INL Site.

3.1 Air Quality

The five Idaho counties containing portions of the INL Site are in an attainment area or are unclassified for National Ambient Air Quality Standards status under the Clean Air Act. The INL Site is classified under the Prevention of Significant Deterioration (PSD) regulations as a Class II area—an area with reasonable or moderately good air quality.

In 2018, the Idaho Department of Environmental Quality issued a facility emission cap permit to construct for INL Site operations. For the purposes of air regulations, the INL Site is an area source of air pollution for pollutants and not regulated by the PSD rules (40 CFR § 52.21). However, an analysis must be performed whenever any new source or modification to a source results in a significant net increase in any air pollutant. The Idaho Department of Environmental Quality specifies significant net emission increases and significant contribution levels for regulated pollutants in the Idaho Administrative Procedures Act Rules for the Control of Air Pollution (IDAPA 58.01.01, 2000).

The Craters of the Moon Wilderness Area, located west-southwest of the INL Site, is a PSD Class I area. Class I areas have the highest level of protection from air pollutants and little deterioration of air quality is allowed.

In addition to National Ambient Air Quality Standards requirements, the Clean Air Act includes National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standard requirements. The primary application of NESHAP requirements at the INL Site is for controlling and reporting radionuclide emissions (40 CFR § 61 Subpart H, 1989). DOE complies with the standards and requirements for radionuclide emissions and associated dose limits to the public (DOE-ID, 2018); however, the proposed action does not involve radionuclide emissions. The INL Site is an area source of hazardous air pollutants under NESHAP regulations. New Source Performance Standard rules apply to any new or reconstructed apparatus to which a standard applies under this program.

3.2 Cultural Resources

Cultural resource investigations for the project area are detailed in *Cultural Resource Investigations of the Proposed Power Grid Test Bed Expansion at the Idaho National Laboratory* (Holmer, Henrikson, & Olson, 2019) and are summarized in Section 4.1.1.4 of this EA.

Cultural resources on the INL Site include the following:

- Pre-contact archaeological sites representing aboriginal hunter-gatherer use over a span of at least 13,500 years
- Late 19th and early 20th century historic archaeological sites representing settlement and agricultural development, ranching, and other activities
- Historic architectural properties that tell the history of the INL Site from its beginnings as a Navy gunnery range to a nuclear science and technology laboratory
- Areas of cultural importance to the Shoshone-Bannock Tribes and other local or regional stakeholders (e.g., historical societies and historic trail organizations).

Pre-field research identified numerous Native American archaeological resources in the area of potential effect (APE). The APE is defined in 36 CFR 800.16(d) (2004) as "…the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking…" The APE for cultural resources in the project area spans 200 ft on either side of the centerline of the proposed OHL.

These resources range from isolated artifacts and field camps representing temporary use, to base camps that exhibit extended periods of use and occupation. These resources are distributed along the entire length of the project APE with some areas exhibiting higher frequencies and densities of Native American cultural resources. Numerous homestead plots and established irrigation ditches are also located in the project APE, as indicated by General Land Office records, suggesting the possible presence of Euroamerican structures, features, and isolated finds. However, the lack of Euroamerican resources identified in the project APE may suggest that many of the homesteading plots identified on the General Land Office records were not occupied or proofed.

During World War II, the Arco Naval Proving Ground (NPG) occupied part of the INL Site, and the area supported refurbishing and testing of large naval guns. The Arco NPG was one of five specialized ordnance facilities in the United States during World War II. In addition to naval ordnance testing, the U.S. Army used lands adjacent to the Arco NPG for aerial bombing training ranges. The Arco NPG provided the core setting for the National Reactor Testing Station in the late 1940s and the evolution of present-day INL Site. National Register criteria-based evaluations in 1993 and 1997 identified the remaining Arco NPG buildings and structures, and the associated cultural landscape, as signature historic properties with national level significance to DOE (DOE-ID, 2016). Remnants of these facilities and associated features are in the current project APE.

3.3 Ecological Resources

The INL Site occupies one of the largest remnants of undeveloped, ungrazed sagebrush steppe ecosystems in the Intermountain West (INL, 2016). The INL Site is home to the Idaho National Environmental Research Park. The National Environmental Research Park is an outdoor laboratory for evaluating the environmental consequences of energy use and development and strategies to mitigate effects from energy use and development. A portion of the INL Site has been designated as the Sagebrush Steppe Ecosystem Reserve that supports researching and preserving sagebrush steppe.

In addition, DOE and the United States Fish and Wildlife Service (USFWS) established the *Candidate Conservation Agreement for Greater Sage-grouse (Centrocercus urophasianus) on the Idaho National Laboratory Site* (hereafter referred to as the CCA) (DOE-ID & USFWS, 2014) for the protection of greater sage-grouse on the INL Site. DOE and USFWS continue to collaborate on sage-grouse protection at the INL Site although sage-grouse no longer warrant protection under the Endangered Species Act. Because of DOE's USFWS's foresight in signing the CCA, DOE continues to have a large measure of certainty and flexibility to pursue its mission, while preserving ecological resources at the INL Site.

A shrub overstory with a grass and forb understory forms most natural vegetation across the INL Site. Wyoming big sagebrush is the most common shrub, though basin big sagebrush dominates or co-dominates in areas with deep or sandy soils.

The INL Site supports a variety of vertebrates, including several sagebrush-obligate species, meaning species that need sagebrush to survive. These species include sage sparrow, Brewer's sparrow, northern sagebrush lizard, greater sage-grouse, and pygmy rabbit.

The USFWS lists, by county, threatened and endangered species and other species of concern for the State of Idaho. The following list includes the species listed as threatened in the five counties of which the INL Site is a part (there are no species listed as endangered):

- Bull Trout
- Canada Lynx
- North American Wolverine (proposed)
- Ute Ladies'-tresses
- Whitebark Pine
- Yellow-Billed Cuckoo.

Several species of concern or candidate species occur on the INL Site, including sage-grouse, three species of bats (i.e., long-eared myotis, small-footed myotis, and Townsend's big-eared), pygmy rabbit, Merriam's shrew, long-billed curlew, ferruginous hawk, northern sagebrush lizard, and loggerhead shrike. The USFWS is evaluating if the little brown myotis and the big brown bat warrant listing under the Endangered Species Act.

Intensive ecological surveys were completed along the 16.5-mile proposed OHL route within about 130 ft on either side. A general survey, including 2 miles either side of the proposed OHL, was completed to address long-term power line impacts to ecological resources beyond the area directly disturbed by construction. These surveys analyzed topographic maps, aerial photos, and habitat models. Sage-grouse lek distribution and male lek attendance has been collected in the vicinity since 2008. Surveys identified no threatened or endangered species in the project area. The following subsections present site-specific information on the ecological resources of the project area from these evaluations and is summarized from Hafla et al. (2019).

3.3.1 Plant Communities

Hafla et al. (2019) describes plant communities in the project area and bases vegetation classes on dominant and co-dominant species. Vegetation class distribution across PGTB is shown in Figure 5. Project area surveys identified 12 plant communities in 2018 (Table 4). Four wildland fires between 1995 and 2010 burned about 50% of the plant communities and some locations have burned multiple times. Green rabbit brush and perennial grasses and forbs dominate plant community composition in burned areas. Sagebrush plant communities dominate the remaining 50% of the project area and cover about 276 acres. Both burned and unburned plant communities reflect prior soil disturbance adjacent to roads and along a buried cable corridor.

Most post-fire plant communities lack sagebrush and have a fair ecological condition. Non-native annuals, such as cheatgrass and Russian thistle, range from abundant to dominant in localized patches and often occupy shallow rocky soils on basalt outcroppings. These areas represent a moderately degraded ecological condition.

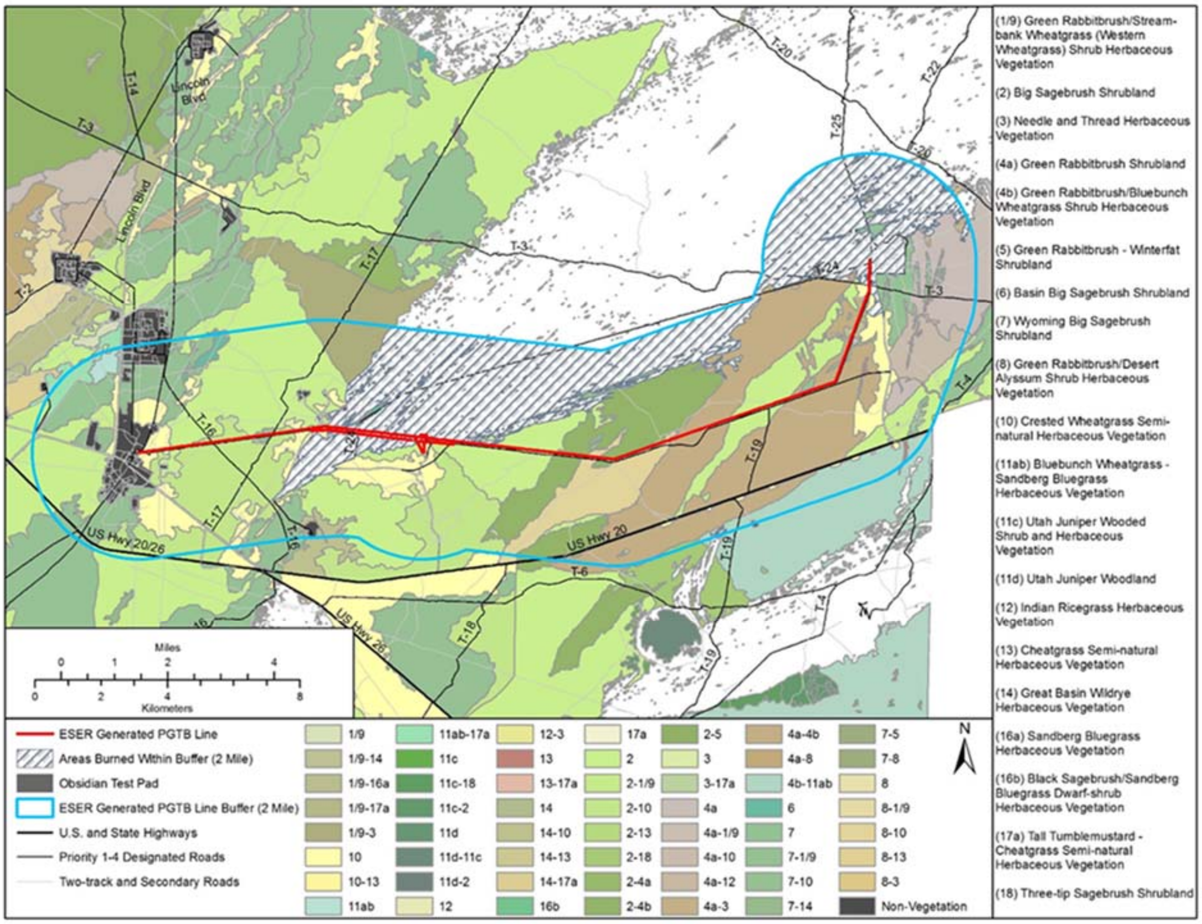

Figure 5. PGTB vegetation class distribution.

Table 4. Vegetation classes documented in the proposed project area.

Class #	Scientific Class Name	Colloquial Class Name
2	*Artemisia tridentata* Shrubland	Big Sagebrush Shrubland
4a	*Chrysothamnus viscidiflorus* Shrubland	Green Rabbitbrush Shrubland
4b	*Chrysothamnus viscidiflorus*/*Pseudoroegneria spicata* Shrub Herbaceous Vegetation	Green Rabbitbrush/Bluebunch Wheatgrass Shrub Herbaceous Vegetation
6	*Artemisia tridentata* ssp. *tridentata* Shrubland	Basin Big Sagebrush Shrubland
7	*Artemisia tridentata* ssp. *wyomingensis* Shrubland	Wyoming Big Sagebrush Shrubland
8	*Chrysothamnus viscidiflorus*/*Alyssum desertorum* Herbaceous Vegetation	Green Rabbitbrush/Desert Alyssum Shrub Herbaceous Vegetation
10	*Agropyron cristatum* (*Agropyron desertorum*) Semi-natural Herbaceous Vegetation	Crested Wheatgrass Semi-Natural Herbaceous Vegetation
11ab	*Pseudoroegneria spicata – Poa secunda Herbaceous Vegetation*	Bluebunch Wheatgrass - Sandberg Bluegrass
13	*Bromus tectorum* Semi-natural Herbaceous Vegetation	Cheatgrass Semi-natural Herbaceous Vegetation
14	*Leymus cinereus* Herbaceous Vegetation	Great Basin Wildrye Herbaceous Vegetation

Class #	Scientific Class Name	Colloquial Class Name
16a	*Poa secunda* Herbaceous Vegetation	Sandberg Bluegrass Herbaceous Vegetation
17a	*Sisymbrium altissimum – Bromus tectorum* Semi-natural Herbaceous Vegetation	Tall Tumblemustard - Cheatgrass Semi-natural Herbaceous Vegetation

A shrub overstory with a grass and forb understory characterize sagebrush communities in the project area. A mix of big sagebrush and green rabbitbrush composes the shrub overstory. Native perennial grasses and introduced annual grasses and forbs, or a combination of the two, dominate the understory. Within the project area, the ecological condition of sagebrush communities ranges from good to moderately degraded.

Big sagebrush communities occur more frequently than other vegetation classes across the project area. The three big sagebrush classes account for about 47% of 137 sampled locations. Plant communities dominated by herbaceous species represent about 34% of sample locations and crested wheatgrass or cheatgrass dominate in non-native vegetation classes. Green rabbitbrush with a native understory dominates about 19% of sample locations.

Vulnerable and imperiled plant communities are often associated with unique soils and land forms or are sensitive to stressors that lead to degradation. Poorly-drained playas that historically supported basin wildrye stands occur throughout the project area. These plant communities are limited in distribution and often degraded throughout their range due to shifts in the hydrologic regime. Bluebunch wheatgrass occurs in the southeastern portion of the project area and these communities were once widespread throughout their range, but their distribution has become limited due to overgrazing.

3.3.1.1 Invasive and Non-Native Species. Eleven of Idaho's noxious weeds have been identified on the INL Site. Hafla et al. (2019) documents musk thistle and Canada thistle (10 times) in the project area. Both are common on the INL Site and were found interspersed along T-25 from MFC to the junction of T-25 and the Haul Road, west of CITRC. Cheatgrass is present to dominant in most vegetation survey plots, and halogeton is present on many survey points, although never dominant.

3.3.1.2 Sensitive Plants. Five sensitive plant species have the potential to occur in the survey area, based on habitat requirements and habitat availability on and around PGTB (Table 5).

Table 5. Special status plant species with the potential to occur in the project area.

Scientific Name	Common Name	Habitat
Astragalus gilviflorus	Plains Milkvetch	Sagebrush communities on barren knolls and stony hilltops
Cuscuta denticulata	Desert Dodder	Grows on shrubs in dry sandy, gravelly, and rocky soils
Eriogonum hookeri	Hooker's Buckwheat	Sandy soils in sagebrush and juniper communities
Lesquerella obdeltata	Middle Butte Bladderpod	Small playas with clayey soils
Phacelia inconspicua	Hidden Phacelia	North-facing slopes with sagebrush in sandy soils

July surveys identified no sensitive plant species in the project area. However, the five sensitive plant species potentially occurring in the project area are either annuals or short-lived perennials. Local population persistence is variable, and populations may be more detectable in some years than others. Therefore, survey results from 2018 may not reflect population distribution in other years. These species could occur anywhere in the project area that has appropriate habitat during any given year.

3.3.1.3 Ethnobotany. Species of ethnobotanical importance occur on and around the project area. Hafla et al. (2019) list species of historical importance taken from *Plant Communities, Ethnoecology, and Flora of the Idaho National Engineering Laboratory* (Andersen, Ruppel, Holte, & Rope, 1996). The list includes species used by "indigenous groups of the eastern Snake River Plain." These species are abundant and widespread throughout the area and across much of the INL Site. Table 6 lists species of ethnobotanical importance at PGTB.

Table 6. Species with ethnobotanical significance occurring in or around the proposed project footprint.

Scientific Name	Common Name	Uses
Achnatherum hymenoides	Indian Ricegrass	food
Allium textile	Textile Onion	food, medicine, flavoring, and dye
Artemisia tridentata	Big Sagebrush	food, medicine, cordage, clothing, shelter, fuel, and dye
Bromus tectorum	Cheatgrass	food
Carex douglasii	Douglas' Sedge	food and medicine
Chaenactis douglasii	Douglas' Dustymaiden	food and medicine
Chenopodium fremontii	Fremont's Goosefoot	food
Chenopodium leptophyllum	Narrowleaf Goosefoot	food
Chrysothamnus viscidiflorus	Green Rabbitbrush	medicine and gum
Crepis acuminata	Tapertip Hawksbeard	food
Delphinium andersonii	Anderson's Larkspur	medicine and dye
Descurainia pinnata	Western Tansymustard	food and medicine
Descurainia sophia	Herb Sophia	food and medicine
Ericameria nauseosus	Rubber Rabbitbrush	medicine and gum
Elymus elymoides	Bottlebrush Squirreltail	food
Elymus lanceolatus	Streambank Wheatgrass	food
Eriogonum ovalifolium	Cushion Buckwheat	medicine
Erigeron pumilus	Shaggy Fleabane	medicine and arrow tip poison
Gutierrezia sarothrae	Broom Snakeweed	medicine
Hesperostipa comata	Needle-and-Threads	food
Lappula occidentalis	Flatspine Stickseed	food
Lactuca serriola	Prickly Lettuce	food and medicine
Leymus cinerus	Basin Wildrye	food and manufacture
Lomatium dissectum	Fernleaf Biscuitroot	food and medicine
Lomatium foeniculaceum	Desert Biscuitroot	food and medicine
Lygodesmia grandiflora	Largeflower Skeletonplant	food and gum
Mentzelia albicaulis	Whitestem Blazingstar	food
Oenothera caespitosa	Tufted Evening-Primrose	food and medicine
Opuntia polyacantha	Pricklypear	food
Phacelia hastata	Silverleaf Phacelia	food
Poa secunda	Sandberg Bluegrass	food and medicine
Pteryxia terebinthina	Turpentine Wavewing	food
Rumex venosus	Veiny Dock	food and medicine
Salsola kali	Russian Thistle	food
Sisymbrium altissimum	Tall Tumblemustard	food
Sphaeralcea munroana	White-Stemmed Globe-Mallow	food, medicine, and manufacture

Scientific Name	Common Name	Uses
Pleiacanthus spinosus	Thorn Skeletonweed	food and gum
Taraxacum officinale	Common Dandelion	food and medicine
Tragopogon dubius	Yellow Salsify	food, medicine, and gum

3.3.2 Wildlife

Resident wildlife species in the project area include big game (e.g., elk and pronghorn), small and medium-sized mammals (e.g., bushy-tailed woodrat, black-tail jackrabbit, mountain cottontail, and badger), bats, and reptiles (e.g., sagebrush lizard, short-horned lizard, western rattlesnake, and gopher snake). Rattlesnake Cave, a snake hibernaculum, is located east of the project area near MFC, and snakes likely migrate through portions of the project area. Surveys identified no additional hibernation sites.

Big game species utilize most of the INL Site, including the project area. Surveys indicate elk and pronghorn frequent the project area. Big game surveys indicate big game species use the area throughout the year. Elk use the general area for calving and pronghorn fawn in the area. The INL Site contains critical winter range for both elk and pronghorn. Over 100 elk and about 500 pronghorn summer on the INL Site (Hafla, et al., 2019).

Small mammals create a prey base for larger predators such as coyotes and bobcats. Small mammal species occur in the project area, including black-tailed jackrabbit, mountain cottontail, Townsend’s ground squirrel, bushy-tailed woodrat, deer mouse, and montane vole. Sensitive species such as prairie falcon, ferruginous hawk, bald eagle, and golden eagle also prey on small mammals.

Hafla et al. (2019) documented pygmy rabbits, burrow systems, and signs during surveys within about 130 ft on either side of the proposed OHL. Burrowing owls use pygmy rabbit burrow systems, although project surveys did not document burrowing owls.

Bird species, including sage sparrow, Brewer’s sparrow, horned lark, western meadowlark, sage thrasher, mourning dove, loggerhead shrike, common nighthawk, red-tailed hawk, ferruginous hawk, Swainson’s hawk, northern harrier, prairie falcon, and common raven, use the project area.

In addition, the CCA commits DOE to protecting sagebrush habitat within 0.6 miles of known leks (Figure 6) and establishes a sage-grouse conservation area outside the core development area of the INL Site to protect nesting, brood rearing, and wintering habitat (DOE-ID & USFWS, 2014). The proposed project area is not within the established sage-grouse conservation area but is subject to DOE’s no net-loss of sagebrush habitat policy on the INL Site.

In addition to sage-grouse, Table 7 lists other sensitive species in the project area.

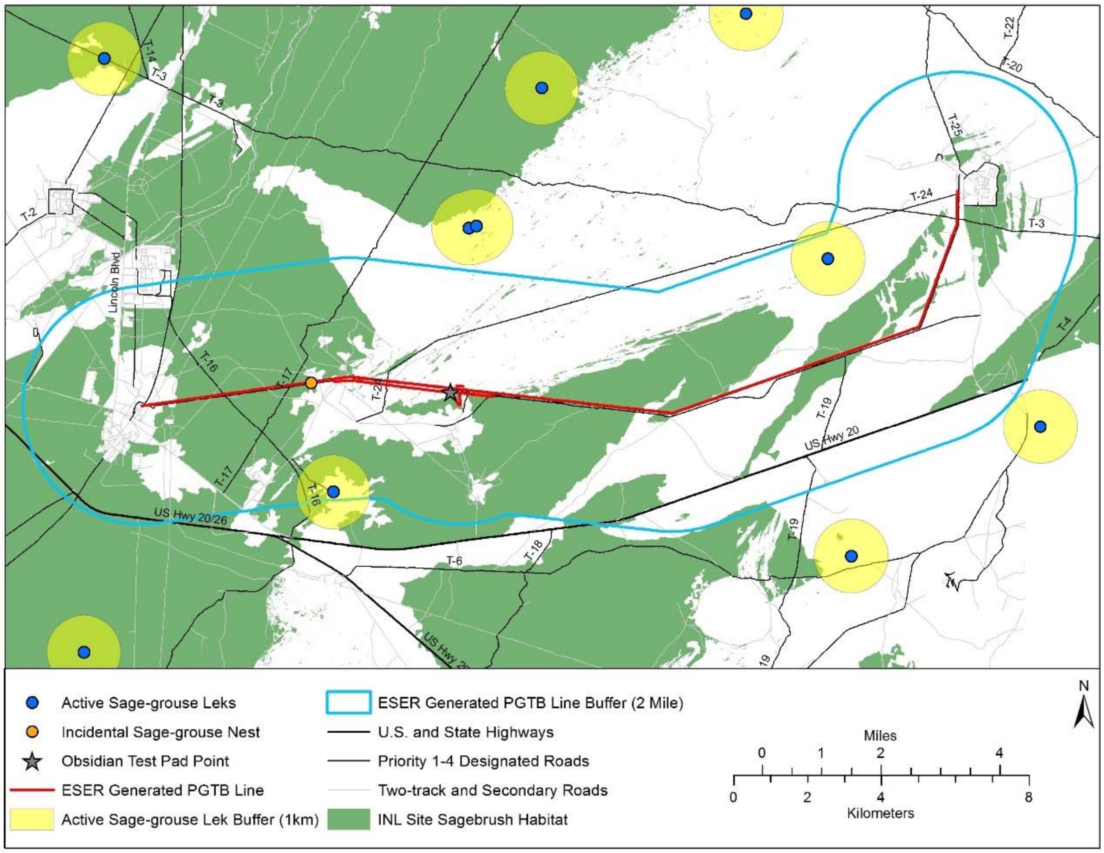

Figure 6. Sage-grouse leks, buffer areas, and sagebrush habitat in the project area.

Table 7. Sensitive wildlife species found on the INL Site.

Common Name	Scientific Name
Great Basin Spadefoot Toad	*Spea intermontana*
Western Rattlesnake**	*Crotalus oreganus*
Long-Nosed Leopard Lizard**	*Crotaphytus wislizenii*
Greater Sage-Grouse**	*Centrocercus urophasianus*
Ferruginous Hawk**	*Buteo regalis*
Golden Eagle**	*Aquila chrysaetos*
Long-Billed Curlew**	*Numenius americanus*
Franklin's Gull**	*Leucophaeus pipixcan*
Burrowing Owl**	*Athene cunicularia*
Short-Eared Owl**	*Asio flammeus*
Common Nighthawk**	*Chordeiles minor*
Sage Thrasher**	*Oreoscoptes montanus*
Sagebrush Sparrow**	*Artemisiospiza nevadensis*
Grasshopper Sparrow**	*Ammodramus savannarum*
Pygmy Rabbit**	*Brachylagus idahoensis*
Townsend's Big-Eared Bat**	*Corynorhinus townsendii*
Silver-Haired Bat**	*Lasionycteris noctivagans*

Common Name	Scientific Name
Hoary Bat**	*Lasiurus cinereus*
Western Small-Footed Myotis**	*Myotis ciliolabrum*
Little Brown Myotis**	*Myotis lucifugus*
**These species have been detected in the project area or have the potential to occur in the project area.	

3.4 Soils

Project area soils range from shallow to deep (less than 20 in. to more than 60 in.) and are moderately coarse-textured soils on basalt plains (Hafla, et al., 2019). These soil complexes include several soil mapping units (Figure 7). The proposed action directly affects the Coffee-Nargon-Atom complex (2 to 12% slopes), Malm-Bondfarm-Matheson complex (2 to 8% slopes), Grassy Butte sand (2 to 20% slopes), Menan silt loam (0 to 2% slopes), and Typic Camborthids-Typic Calciorthids soil types. Coffee-Nargon-Atom makes up most of the project footprint, at about 63%, while Malm-Bondfarm-Matheson makes up about 21%, Grassy Butte sand about 9%, Menan silt loam about 6%, and Typic Camborthids-Typic-Calciorthids less than 2%.

The Malm-Bondfarm-Matheson complex has a high wind erosion potential. These soils have very severe limitations that make them unsuitable for cultivation due to erosion—an important consideration for restoration or long-term erosion control measures. In addition, Grassy Butte sand is confined to the CITRC area. This soil is excessively well drained with a very high hazard of soil blowing and impaired trafficability. Reseeding this soil is extremely difficult. Soils with high erosion potential that are resistant to reseeding make up about 30% of the project footprint.

3.5 Human Health

In this EA, human health considers both INL Site workers and the general public traveling through the INL Site. Worker health monitoring programs assess potential health concerns, including exposures to radioactive materials, hazardous chemicals, and routine workplace hazards such as electrical shock or physical injury. The greatest worker health hazard associated with the proposed action is electrocution. Physical injuries (e.g., falls) can also be a potential hazard. Worker exposure to electromagnetic fields (EMF) during operations and maintenance is another potential concern. DOE does not routinely monitor the effects to power line workers from EMF exposures.

Public health near the INL Site can be indirectly evaluated through ongoing environmental monitoring programs. Annual air, water, soil, and biota monitoring data indicate public exposures to INL Site emissions are maintained at or below permitted or recommended levels and protect public health and welfare. Electrocution or physical injuries to members of the public are not considered a potential hazard due to restricted access to the INL Site. EMF exposures from power lines to members of the public are not subject to regulatory limits.

EMFs occur naturally and from human activity. The weather and Earth's geomagnetic field generate naturally occurring EMFs. Magnetic fields associated with transmission lines are created when current flows through the conductors; EMF strengths are determined primarily by line current, line height, and distance. Electrical transmission and distribution systems are not the only man-made sources of magnetic fields. Man-made EMF sources in homes and workplaces include electric wiring and appliances.

No federal regulations have established environmental limits on the strengths of fields from power lines; however, the federal government continues to conduct and encourage research on the EMF issue.

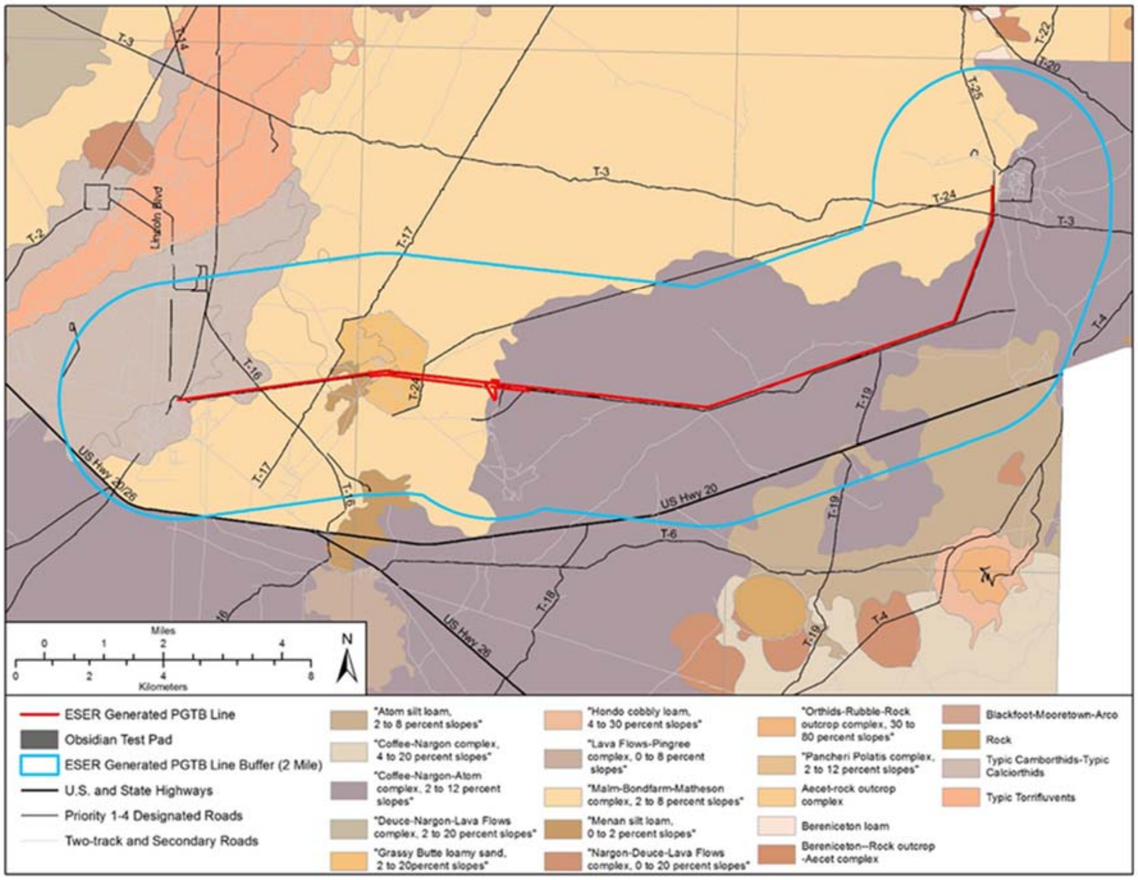

Figure 7. Soil mapping units in the vicinity of PGTB.

3.6 Intentional Destructive Acts

Vandalism, terrorist attacks, and sabotage could target power lines. The proposed action presents an unlikely target for an act of terrorism at the INL Site and would have an extremely low probability of attack. However, because neither the possibility nor the probability of an attack is truly known, the risk of terrorism or sabotage and any consequent environmental impact cannot be reliably estimated. Federal and other utilities use physical deterrents (e.g., fencing, cameras, warning signs, and rewards) to help deter theft, vandalism, and unauthorized access to facilities. Security measures are in place at the INL Site to prevent theft, vandalism, and other destructive acts. A highly trained and equipped Protective Force prevents attacks against and entry into INL Site facilities. Protective Force controls access to the INL Site from public entry on Highways 20, 26 and 33, and allows access only to persons conducting official business and having proper credentials.

4. ENVIRONMENTAL CONSEQUENCES

This section evaluates potential impacts of the proposed action and no action alternative. The CEQ regulations for implementing NEPA require the environmental consequences discussion to address both direct and indirect effects and their significance (40 CFR § 1502.16). Direct effects are caused by the action and occur at the same time and place (40 CFR § 1508.8). Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR § 1508.8). This section discusses potential direct, indirect, and cumulative environmental impacts resulting from implementation of the proposed action.

DOE analyzed the direct, indirect, and cumulative impacts from the proposed action and no action alternatives. Intensive ecological surveys along the 16.5-mile proposed OHL route within about 130 ft on either side were completed. A general survey, including 2 miles either side of the proposed OHL, was completed to address long-term OHL impacts to ecological resources beyond the area directly disturbed by construction. These surveys analyzed topographic maps, aerial photos, and habitat models. Sage-grouse lek distribution and male lek attendance has been collected in the vicinity since 2008. In addition, the APE for cultural resources in the project area spans 200 ft on either side of the centerline of the proposed OHL.

4.1 Proposed Action

The specific location of each pole structure cannot be determined until final design is complete. Therefore, assumptions were made to determine impacts of the proposed action within the project area. The size of the OHL corridor is described in Section 2. Disturbance was quantified for both temporary and permanent disturbance to estimate the amount of acreage disturbed. Assumptions are summarized in Table 1. Using these assumptions, the proposed action permanently disturbs about 227 acres. The final design will recalculate the amount of anticipated disturbance when road and structure locations are known.

All Haul Road shipments would be made in accordance with applicable operational controls identified in DOE/EA-1772 (2010) including weight, weather, speed, and time-of-day restrictions. The Haul Road EA analyzed the potential environmental impacts from a total of 18,960 shipments (an average of 474 shipments per year) of spent fuel, special nuclear material, research fuel, test or experiment materials, and specific types of waste. The analysis was based on the number of shipments and the radiological profile of shipments. The proposed action does not include radiological shipments that were not analyzed in DOE/EA-1772.

The transportation of non-nuclear shipments was not specifically analyzed in the Haul Road EA but was discussed briefly in Appendix B (page B-16) of DOE/EA-1772. Although the Haul Road EA did not analyze the impacts of non-nuclear shipments using the Haul Road, it noted such use could be incorporated in other NEPA reviews. As stated above, Table 1 in the Haul Road EA estimated 18,960 Haul Road shipments (an average of 474 shipments per year), not exceeding 80,000 lb, would occur from 2010 to 2050 (the road has a design capacity for a 100,000-lb gross vehicle weight, double-drop, three-axle trailer with a 6-in. ground clearance). DOE noted the number of shipments analyzed in the Haul Road EA only projected DOE transportation needs as anticipated in 2010 and the number of shipments was expected to grow.

The Haul Road EA implemented operational controls to minimize the environmental impacts to biological resources from Haul Road use. The proposed action complies with operational controls such as restricting the road for official use only (as determined and approved by the Haul Road manager), implementing weed control, seasonal or time-of-day restrictions, speed limits, and cultural resource awareness training. Nuclear material transfers would continue to receive priority use of the Haul Road.

Since operation of the Haul Road began in 2012, less than 300 transportation events have occurred on the road, which is fewer than the 474 shipments estimated in the Haul Road EA to occur every year until about 2050. Adding additional uses per year would not result in a substantial increase in the estimated number of annual or total shipments and would not result in a substantial change in the environmental impacts analyzed in the Haul Road EA (DOE-ID, 2010).

In addition, preliminary analysis indicates the proposed action would not impact the following elements: land use and aesthetic resources, socioeconomics, environmental justice, and surface water. Therefore, this EA does not analyze these elements further for the following reasons:

- **Environmental Justice** – Analysis identified no significant adverse human health or environmental effects for the proposed action at the INL Site or in surrounding areas. This includes the potential for elevated emissions analyzed in Section 4.1.2 of this EA. Therefore, the proposed action would not result in disproportionately high and adverse human health or environmental effects on minority populations and/or low-income populations.

- **Land Use** – Implementing the proposed action would not introduce new land uses at the INL Site. Activities associated with the proposed action are consistent with current land uses for the INL Site and PGTB.
- **Socioeconomics –** Implementing the proposed action could result in hiring new employees over time at the INL Site. However, because the increase would be gradual over time and would be minimal compared to the rest of the INL Site workforce, potential impacts on the local economy, housing demand, and population growth would be negligible. Therefore, implementing the proposed action would not result in impacts on socioeconomics over the no action alternative.
- **Ground and Surface Water** – There are no streams or other bodies of surface water in the project area. The proposed action does not include activities that physically or chemically alter surface water resources. Therefore, the proposed action does not affect ground or surface water resources.

The proposed action also includes design features to mitigate and avoid environmental impacts. These project controls are discussed in Section 4.1.1.

4.1.1 Project Controls

This section discusses project controls to minimize environmental impacts. These design features apply to constructing, operating, and maintaining the completed OHL, test pads, substation, road upgrades, and other project components.

4.1.1.1 Air Resources. The proposed action has the potential to generate particulate emissions (i.e., dust) from bulldozing, grading, excavating, and dumping during construction, and additional grading for road maintenance. To reduce the potential for fugitive dust, construction crews apply water to the OHL corridor, temporary spur routes, and the T-25 power line access road and Haul Road. In addition, the proposed action gravels permanently disturbed areas such as test pads and parking areas to reduce fugitive dust and control erosion.

All portable/mobile generators used during construction and operations and testing activities would be removed within 1 year of installation.

4.1.1.2 Hazardous Materials and Waste. Fuel trucks transport fuel to construction equipment in the field. Mobile equipment presents the only substantial sources of potential petroleum or other hazardous material spills. If a fuel, oil, or other hazardous material spill occurs, the spill is cleaned up as soon as possible. If necessary, soil remediation removes contaminated soils, and Waste Generator Services characterizes, manages, and disposes of contaminated soil in an approved facility. Soil sample(s) then verify successful removal.

Covered dumpsters contain refuse and are emptied when full. Following activities at each construction site, crews remove refuse, including, but not limited to, broken equipment parts, wrapping material, cords, cables, wire, rope, strapping, twine, buckets, metal or plastic containers, and boxes from the site. They will then work with Waste Generator Services to disposition all waste and divert waste from the landfill. Project controls include reusing and recycling items where practicable.

Portable toilets supply sanitary facilities during construction. Licensed vendors furnish portable toilets, maintain them on a regular basis, and pump portable toilet waste to approved INL Site facilities (e.g., the CFA sewage treatment plant) after verifying the discharge meets facility acceptance criteria.

The proposed action follows other local, state, and federal regulations relating to using, handling, storing, transporting, and disposing of hazardous materials.

4.1.1.3 Fire Prevention and Protection. DOE requires vehicles always have fire tools (e.g., shovels, fire extinguishers, etc.) available and construction crews receive basic fire control training. During operations and maintenance, DOE requires vegetation be mowed and maintained clear of poles and other infrastructure vulnerable to wildland fire. The INL Site's defensible space requirements apply to construction and operations and are as follows:

1. Maintain a 30 to 50-ft defensible area around all buildings, structures, and significant support equipment
2. Maintain a 30-ft defensible area around parking lots, storage pads, designated buildings, designated perimeters, designated propane and fuel tanks, substations, and along-the-rail system within the INL Site.

During seasons having high wildland fire potential, DOE requires a fire tender be present during activities having the potential to start wildland fires (e.g., driving vehicles off road to access power pole locations and performing certain test activities having potential to generate sparks, welding, etc.).

Project controls also require revegetating disturbed areas as described in Section 4.1.1.8. The spread of weeds increases the fire hazard. Section 4.1.1.7 discusses controlling weeds and invasive species.

4.1.1.4 Cultural Resources. Cultural resource inventories were completed for the proposed action and reported in *Cultural Resource Investigations of the Proposed Power Grid Test Bed Expansion at the Idaho National Laboratory* (Holmer, Henrikson, & Olson, 2019). DOE sent this report to the Shoshone-Bannock Tribes and the Idaho State Historic Preservation Office (SHPO) for consultation on the recommended eligibility of historic properties to the National Register of Historic Places (NRHP), and the effects to NRHP eligible properties potentially affected by the proposed action. Overall, most eligible and potentially eligible properties will be avoided through project design, such as spanning sites, monitoring during construction, and limiting construction equipment to existing roads. However, it was determined that five of the 26 eligible and potentially eligible historic properties could be adversely affected by the proposed action.

DOE proposed methods of avoidance for eligible and potentially eligible historic properties located within the project APE. These proposed methods were developed to minimize impacts both during and post construction and include but are not limited to:

- Temporary flagging and fencing to keep construction vehicles and personnel away from eligible and potentially eligible historic properties
- Monitoring ground disturbance to stabilize and evaluate any cultural materials uncovered and implement inadvertent discovery procedures outlined in the Cultural Resource Management Plan (DOE-ID, 2016)
- Installing permanent jack-fencing around eligible and potentially eligible historic properties to prevent unauthorized ground disturbance
- Graveling along designated access roads and formal upgrades to roads to help restrict vehicle traffic to designated areas
- Designating parking, laydown, and assembly areas for construction crews and building fences or barriers to control traffic
- Training PGTB project personnel to foster an appreciation of cultural resources and tribal sensitivities and discourage illegal artifact collection, unauthorized off-road vehicle traffic, and other activities that may indirectly impact cultural resources
- Designing the line to span known sites.

As stipulated in 36 CFR 800.6 (2004) and Appendix C of the CRMP (DOE-ID, 2016) decisions for mitigating or minimizing adverse effects to historic properties are made in consultation with the Shoshone Bannock Tribes, Idaho SHPO, the Advisory Council for Historic Preservation (ACHP), and other stakeholders and interested parties. Consultation conducted in good faith with all parties should lead to agreement on appropriate strategies to mitigate the adverse effects of the proposed action.

If, during any project activities, project personnel discover unanticipated cultural, historical, pre-contact, or prehistoric resources, they must make proper notifications and cease all work in the immediate area. DOE will follow any and all applicable laws that may apply to the discovery dependent on its nature (e.g., the Native American Graves and Repatriation Act (43 CFR Part 10, 1990) and the Archaeological Resource Protection Act (19 USC Ch. 1B, 2004); see the Cultural Resource Management Plan (DOE-ID, 2016). Following an analysis of the discovery, work will continue in the area when DOE has given clearance to do so.

4.1.1.5 Visual Resources. The proposed OHL line traverses areas of the INL Site that are, in general, out of view of the general public from public roads and vantage points. The proposed action uses dark poles to blend and reduce contrast with natural surroundings. Revegetating disturbed areas reduces the appearance of contrast in areas with grassland and shrub vegetation.

4.1.1.6 Human Health and Safety. Construction crews comply with applicable regulations and standards established by regulatory agencies, codes, and professional societies, and manage construction sites to prevent harm to people and property.

During construction, employees, project managers, supervisors, inspectors, contractors, and subcontractors conform to safety procedures. Personnel receive training to perform assigned tasks. Heavy equipment contains required Occupational Safety and Health Administration safety devices such as backup warnings and seat belts. Crews receive hard hats, safety boots, ear and eye protection, and other personal safety equipment upon request. Employees report accidents and injuries to the appropriate safety officer.

4.1.1.7 Invasive and Non-Native Species. Construction crews follow regulations pertaining to control of noxious weeds on INL Site land. PGTB personnel WILL implement future weed control that results from the proposed action as needed. Herbicide use complies with regulations and requirements.

4.1.1.8 Stabilization and Rehabilitation. The proposed action minimizes soil and vegetation disturbance to that necessary to install project components and for future safe operation and maintenance.

Project controls require restoring areas subject to short-term ground disturbance (e.g., pole areas and spur routes) to original contours. Disturbed areas around poles and on spur routes require revegetation as soon as practicable using certified weed-free seed mix composed of native species found in or endemic to the area. Reclamation aims to restore disturbed areas to at least 70% of pre-disturbed cover.

4.1.1.9 Wildlife. The following provisions pertain to general wildlife (e.g., jack rabbits, lizards, snakes, squirrels, etc.) and protected species (e.g., those species protected under various state and federal laws or regulations, such as special status species):

To prevent entrapment of wildlife during construction, crews monitor open pits (pole holes) throughout the construction day and cover excavated pits more than 2-ft deep at the close of each day. Alternatively, fencing may be erected around open pits or trenches. Personnel inspect pits for trapped wildlife at the beginning of the day and prior to filling and facilitate removal of trapped wildlife. Using pesticides (not including insect repellant) is prohibited on project sites.

Greater Sage-Grouse — Time-of-day restrictions apply to construction and maintenance activities within 1 mile of greater sage-grouse (*Centrocercus urophasianus*) leks from March 15 to May 15. Other design features include reclamation (see above) and avoiding habitat disturbance if possible. Construction activities at the INL Site comply with other conservation measures described in the CCA for greater sage-grouse, including avoiding installing power lines within 1 km of active leks and installing raptor perch deterrents on power poles and guy wire flight deterrents when necessary.

In compliance with the CCA (DOE-ID & USFWS, 2014) the project must complete pre and post-construction surveys to establish the amounts of sagebrush restoration and other native revegetation efforts needed to rehabilitate disturbed areas as determined by DOE's Environmental Surveillance, Education, and Research (ESER) contractor. To mitigate the loss of sagebrush and comply with DOE policy, the proposed action requires monitoring sagebrush disturbance and planting amounts equal to that disturbed in areas beneficial to sage-grouse.

The speed limit on temporary and permanent access routes in the project area remain limited to 15 miles per hour to reduce collision potential for greater sage-grouse and other wildlife.

Raptors and Migratory Birds — To minimize impacts to nesting raptors, the proposed action prohibits construction within recommended spatial and seasonal buffers. Spatial and seasonal buffers would be identified by the ESER contractor for species observed in the project area (see Section 3). If topography limits actual line-of-sight between an active nest (i.e., the nest has eggs or young) and construction activities, the spatial and seasonal buffers can be reduced with prior authorization from the ESER contractor.

Work during the migratory bird nesting season (April 1 through October 1) requires a migratory bird nesting survey 72 hours prior to vegetation disturbance in an area. If surveys discover active nests, the project implements measures, such as buffer areas or halting work, to prevent nest abandonment until after the migratory bird nesting season or until young have fledged.

Implementing Avian Power Line Interaction Committee (APLIC) (2006) recommendations minimizes the potential for raptor electrocutions.

Construction and operations personnel also must report dead or injured birds.

4.1.1.10 Project Termination. If DOE determines there is no future use for the installations, the disturbed area will be restored and rehabilitated according to requirements in place at that time.

4.1.2 Air Quality

The proposed construction and operations activities are temporary, intermittent, short duration, and dispersed along a narrow, long strip of land. The proposed action does not install any significant stationary air pollution sources.

The proposed action produces two types of air contaminants: exhaust emissions from construction equipment and generators during testing and fugitive dust from soil disturbance. In general, emissions during construction are exempt from PSD review because the PSD requirements are primarily for major stationary sources and specifically exempt temporary increases in these emissions. Emissions from mobile generators are exempt from regulation since the generators will be in place less than 1 year.

Temporary emissions include reactive organic gases, nitrogen oxides, and respirable particulate matter with an aerodynamic diameter of 10 micrometers or less (referred to as PM_{10}) from construction equipment, construction employee commute trips, material transport (especially on unpaved surfaces), and other construction activities. PM_{10} consists of particulate matter emitted directly into the air (e.g., fugitive dust, soot, and smoke) from mobile and stationary sources, construction operations, fires, and natural windblown dust.

Elevated particulate matter (i.e., dust) concentrations are the greatest concern and result from windy and arid conditions. Construction activities include temporary emissions from backhoes, bulldozers, boom trucks, flatbed trucks, other heavy equipment, and vehicle operations and ground disturbance. Table 8 lists the amount of fugitive dust expected to be generated during construction activities.

Table 8. Fugitive dust emissions (PM_{10}) from the proposed action.

Activity	Emission Factor	Acres	Months	Tons PM_{10} Uncontrolled	Correction Factor	Tons PM_{10} Controlled
General Construction	0.19	216	6	246.24	0.059	14.53
New Road Construction	0.42	22	6	55.44	75.34	31.64
Totals				301.68		46.17

The area-based emissions factor for construction activities is based on a study completed by the Midwest Research Institute (MRI) *Improvement of Specific Emission Factors* (MRI, 1996). The MRI study evaluated seven construction projects in Nevada and California (Las Vegas, Coachella Valley, South Coast Air Basin, and the San Joaquin Valley). The study determined an average emission factor of 0.19 tons PM_{10}/acre-month for sites without large-scale cut/fill operations. A worst-case emission factor of 0.42 tons PM_{10}/acre-month was calculated for sites with active large-scale, earth-moving operations. The monthly emission factors are based on 168 work-hours per month. A subsequent MRI report in 1999, *Estimating Particulate Matter Emissions from Construction Operations*, calculated the 0.19 tons PM_{10}/acre-month emission factor by applying 25% of the large-scale earth-moving emission factor (0.42 tons PM_{10}/acre-month) and 75% of the average emission factor (0.19 tons PM_{10}/acre-month).

The 0.19 tons PM_{10}/acre-month emission factor is referenced by the Environmental Protection Agency (EPA) for non-residential construction activities in procedure documents for the National Emission Inventory (EPA, 2015). The 0.19 tons PM_{10}/acre-month emission factor represents a refinement of EPA's original AP-42 area-based total suspended particle emission factor in Section 13.2.3 *Heavy Construction Operations*. In addition to EPA, this methodology is also supported by the Idaho Department of Environmental Quality and the Western Regional Air Partnership, which is funded by the EPA and is administered jointly by the Western Governors Association and the National Tribal Environmental Council. The emission factor is assumed to encompass a variety of non-residential construction activities, including building construction (commercial, industrial, institutional, and governmental), public works, and travel on unpaved roads. The EPA National Emission Inventory (NEI) documentation assumes that the emission factors are uncontrolled and recommends an adjustment based on silt content and soil moisture. The corrected total PM_{10} is based on EPA emission factors and mean soil and moisture contents (EPA, 2006) and errata added in 2010.

The emission factor for new road construction (0.42 tons PM_{10}/acre-month) is based on the worst-case conditions emission factor from the MRI 1996 study described above (0.42 tons PM_{10}/acre-month). It is assumed that road construction involves extensive earth moving and heavy vehicle travel resulting in emissions that are higher than other general construction projects. The 0.42 tons PM_{10}/acre-month emission factor for road construction is referenced in procedures documents for the EPA NEI (EPA, 2015). The EPA NEI documentation recommends adjusting the emissions factor to account for natural soil moisture (EPA, 2015).

It should be noted that the estimated amounts of PM_{10} in Table 8 are conservative and do not account for project controls for controlling fugitive dust. Actual emissions will likely be much lower. Although temporary increases in these emissions are anticipated, increases are not expected to exceed ambient air quality standards. Similarly, construction emissions of PM_{10} would be considered minimal with the incorporation of project controls to contain fugitive dust. For comparison, Table 9 shows total and average annual NEI PM_{10} emissions from construction and unpaved roads for the five counties in which the INL Site is located (EPA, 2016).

Table 9. Annual tons PM_{10} emissions by county 2007 through 2016.

Source PM_{10}	Bannock	Bingham	Bonneville	Butte	Clark	Total	Annual Average
Construction Dust	269.5	342.9	1,218.186	0.82	0.58	1,831.98	183.2
Unpaved Road Dust	40,001.10	7,741.5	4,294	800.2	264.61	5,3101.11	5,493.3
Totals	40,270.6	8,084.1	5,512.18	801.02	265.19	5,4933.09	5,493.3

Fugitive dust and air emissions from additional uses of the Haul Road do not change the analysis of impacts to air quality analyzed in the Haul Road EA (DOE-ID, 2010), and PM_{10} concentrations from the proposed action combined with the previously approved uses would remain below significant contribution levels (IDAPA 58.01.01.006.109).

Most of the pollutants from operating equipment and generators for maintenance and testing are emitted as exhaust. Some total organic compounds escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all the total organic compounds from diesel engines enters the atmosphere from the exhaust. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels.

A generator with a maximum engine power of 4 megawatts has the potential to emit the pollutants and amounts of each listed in Table 10 (in tons per year) (EPA, 2016):

Table 10. Potential generator emissions.

4 Megawatt Generator Potential to Emit (tons per year)					
CO	NO_x	SO_2	VOC	$PM_{2.5}$	PM_{10}
146.62	34.95	0.3121	7.64	1.526	1.526

For comparison, Table 11 lists the amounts of each pollutant emitted in 2014 in each county in which the INL Site is located. If a generator of this size were operated at each of the 6 test pads for a year (i.e., multiplying emissions by a factor of 6), the CO emitted would be about 1.3% of the total emitted in the five county area; NO_x would be about 1.7%, SO_2 about 0.81%, VOCs about 0.007%, $PM_{2.5}$ about 0.11%, and PM_{10} about 0.003%. These emissions are conservative, because it is unlikely six generators of that size would operate simultaneously and because the testing season is generally about six months long rather than a year. The emissions are negligible.

Table 11. Emission by county in tons per year.

County	CO	NO_X	SO_2	VOC	$PM_{2.5}$	PM_{10}
Bannock	16,370	3,911	30.33	11,528	1,331	8,121
Bingham	15,818	3,301	60.45	16,367	3,474	19,632
Bonneville	23,790	3,633	112.5	17,541	2,680	14,731
Butte	5,064	635	14.05	12,694	463	2,482
Clark	8,639	713	12.90	12,010	400	1,544
TOTAL	69,681	12,193	230.23	70,140	8,348	46,510

Air quality impacts from implementing the proposed action caused by mobile emissions sources used to conduct project activities (including maintenance and testing) and ground disturbance would be minimal and localized and would not cause changes to regional air quality. In addition, the long-term operation and maintenance of the project would not result in any nonpermitted sources of toxic air emissions. Because of the limited nature of construction activities and use of project controls (e.g., applying water to disturbed areas), air quality impacts would be negligible.

4.1.3 Cultural Resources

Under the National Historic Preservation Act (2014) and 36 CFR Part 800 (2004) regulations, the specific legal context of a cultural or historical site's significance as set out in Section 106 of the National Historic Preservation Act (2014), as amended, guides assessing adverse effects on cultural resources. A property may be listed in NRHP if it meets the criteria for evaluation defined in 36 CFR 60.4 (1981):

> The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:
>
> a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
> b) that are associated with the lives of persons significant in our past; or
> c) that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
> d) that have yielded, or may be likely to yield, information important in prehistory or history.

Most Native American archaeological sites are evaluated according to Criterion d, which refers to site data potential. These sites typically lack historical documentation that might describe important characteristics. Applying archaeological methods and techniques contributes to understanding information recovered from sites. DOE evaluates sites partly to obtain data to contribute to answering scientific research questions, but also to apply those data to further understand traditional cultural values. For example, animal bones from an archaeological deposit can provide information about the nature of precontact peoples' diet, foraging range, exploited environments, environmental conditions, and seasons during which various wildlife species were taken. These data help reconstruct Native American ways of life and further understanding of sites that have traditional or spiritual significance to contemporary Native Americans or other groups.

NRHP eligibility determinations also consider archaeological site integrity. Pre-contact and prehistoric site evaluations analyze location, setting, design, workmanship, feeling, association, and materials to assess site integrity. Cultural and post-depositional factors (e.g., highway construction, erosion, disturbance, etc.) may compromise resources, yet sites may retain their integrity under Criterion d if important information potentially remains. Conversely, the quantities or preservation of archaeological materials may be insufficient for accurate identification, which reduces the potential to obtain information. Assessing these qualities is particularly important when the spatial relationships of artifacts and features are necessary to determine patterns of past human behavior.

During the summer and fall of 2018, intensive surveys were completed on 697 acres within the project area APE identified as un-surveyed or surveyed more than 10 years ago. The *Cultural Resource Investigations of the Proposed Power Grid Test Bed Expansion at the Idaho National Laboratory* (Holmer, Henrikson, & Olson, 2019) details the results of the cultural resource investigations and is summarized here. The cultural resource surveys documented two new Native American sites, two historic roads, six new Native American isolated finds, and rerecorded 22 previously recorded sites (21 Native American and one historic ditch). All but three recorded and rerecorded cultural resources relate to Native American land use and contribute to overall understanding of Native American life-ways on the INL Site and surrounding landscape.

Following the 2018 intensive cultural resource surveys, Holmer, Henrikson, & Olson (2019) provided effects determinations for the eligible and potentially eligible sites in the project APE. It was recommended and concurred on by Idaho SHPO that the proposed road upgrades to T-25 will adversely affect five sites that are bisected by the T-25 road (i.e., 10BM0109, 10BT1049, 10BT1052, 10BT1059, and 10BT1062). Two of these five sites (i.e., 10BT1052 and 10BT1059) were determined eligible to the NRHP (with Idaho SHPO concurrence) following the 1988/89 subsurface evaluations performed by a subcontractor from Idaho State University. The remaining three sites that are bisected by T-25 (i.e., 10BM0109, 10BT1049, and 10BT1062) were also evaluated during 1988/1989 and were concurred on to be potentially eligible for the NRHP under Criterion d.

Decisions regarding appropriate measures to mitigate and minimize adverse effects to historic properties will be made in consultation with the Shoshone-Bannock Tribes, ACHP, and Idaho SHPO. The measures will be formalized in a memorandum of agreement (MOA) that will be signed prior to making the NEPA decision. If an agreement cannot be reached through consultation, DOE will formally ask the ACHP to join the consultation.

Through avoidance strategies and administrative and engineering controls, the proposed action will either have no effect or no adverse effect on the remaining potentially eligible sites (i.e., 10BM0110, 10BM0116, 10BM0117, 10BM0821, 10BT1043, 10BT1044, 10BT1045, 10BT1053, 10BT1056, 10BT1247, 10BT1567, LMIT-97-16-05, 10BT2478, 10BT2479, 10BT1224, and 10BT1225). Table 12 summarizes the effects determinations for each potentially eligible and eligible historic property in the project APE.

Ground disturbance has the potential to affect previously undetected cultural resources beneath the surface, including previously unknown buried human remains. Federal law recognizes the need to protect historic era and Native American human burials, skeletal remains, and items associated with Native American interments from vandalism and inadvertent destruction. The procedures for the treatment of Native American human remains are contained in the Native American Graves Protection and Repatriation Act and implementing regulations. Damage to, or destruction of, human remains during project-related activities would be considered a significant impact. However, implementing the project controls listed in Section 4.1.1.4 reduces the likelihood of significant impacts to known and unknown cultural resources.

Sixteen buildings required evaluating effects from the proposed action on historical characteristics; 14 buildings and structures lie within the project viewshed and two within the APE. Seven of the 14 properties within the viewshed are exempt utility structures, three are exempt mobile trailers, three are not eligible, and one is eligible as a signature property. Table 13 lists the buildings evaluated and the impacts to those structures from the proposed action.

Table 12. Effects determinations and avoidance strategies for resources in the project APE.

Site/Temporary Number	Mitigation/Avoidance Strategy	Effect Determination
10BM0109	Subsurface evaluations are required in portions of the site near the access road. Data recovery may be necessary if buried, intact cultural deposits are encountered.	Adverse effect
10BM0110	Permanent fencing will be erected around the perimeter of the site to prevent unauthorized traffic inside site boundaries during and post construction. Fence construction will be monitored by the CRMO.	No adverse effect
10BM0116	Permanent fencing will be erected around the perimeter of the site to prevent unauthorized traffic inside site boundaries during and post construction. Fence construction will be monitored by the CRMO.	No adverse effect
10BM0117	Permanent fencing will be erected around the perimeter of the site to prevent unauthorized traffic inside site boundaries during and post construction. Fence construction will be monitored by the	No adverse effect

Site/Temporary Number	Mitigation/Avoidance Strategy	Effect Determination
	CRMO and eventual subsurface evaluations will determine site eligibility.	
10BM0821	Temporary flagging for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1043	Permanent fencing will be erected around the perimeter of the site to prevent unauthorized traffic inside site boundaries during and post construction. Fence construction will be monitored by the CRMO.	No adverse effect
10BT1044	Temporary flagging for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1045	Temporary flagging, or permanent fencing, for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1049	Subsurface evaluations are required in portions of the site near the access road. Data recovery may be necessary if buried, intact cultural deposits are encountered.	Adverse effect
10BT1052	Subsurface evaluations are required in portions of the site near the access road. Data recovery may be necessary if buried, intact cultural deposits are encountered.	Adverse effect
10BT1053	Temporary flagging for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1056	Temporary flagging for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1059	Subsurface evaluations are required in portions of the site near the access road. Data recovery may be necessary if buried, intact cultural deposits are encountered.	Adverse effect
10BT1062	Subsurface evaluations are required in portions of the site near the access road. Data recovery may be necessary if buried, intact cultural deposits are encountered.	Adverse effect
10BT1224	Site is situated on the south side of the alternate southern route in CITRC. No ground disturbance is planned for the area. No action is required.	No effect
10BT1225	Site is situated on the south side of the alternate southern route in CITRC. No ground disturbance is planned for the area. No action is required.	No effect
10BT1247	Temporary flagging for avoidance and monitoring during construction will prevent ground disturbance within the site boundary.	No adverse effect
10BT1567	Temporary flagging along access road during construction.	No effect
10BT2478	Fencing is required to keep construction and subsequent power maintenance outside of site boundaries.	No adverse effect
10BT2479	Fencing is required to keep construction and subsequent power maintenance outside of site boundaries.	No adverse effect

Site/Temporary Number	Mitigation/Avoidance Strategy	Effect Determination
LMIT-97-16-05	Temporary flagging for avoidance and monitoring during construction will keep ground disturbing activities outside the site boundary.	No adverse effect
BEA-18-14-02	Temporary flagging will be placed to keep any potential traffic outside of the site boundaries.	No effect
BEA-18-14-04	Temporary flagging will be placed to keep any potential traffic outside of the site boundaries.	No effect
BEA-18-14-10	T-3; project will not be allowed to use potentially eligible historic road for access or construction. Road will be flagged for avoidance.	No adverse effect
BEA-18-14-11	T-16; project will not be allowed to use potentially eligible historic road for access or construction. Road will be flagged for avoidance.	No adverse effect
10BT1562/01-TEMP	John and Max Wiese ditches; pole locations will be outside property boundaries and ditches will be temporarily flagged for avoidance.	No adverse effect

Table 13. Built environment eligibility and impacts.

Property ID	Name	Construction Date	Previously Recorded	Idaho Historic Sites Inventory Number	National Register Eligibility	Property Category	Potential Impact
CF-1624	CFA 12.5-kV Switchgear Building	2018	No	NA	Exempt	NA	Viewshed
CF-633	Arco NPG Concussion Wall	1943	Yes	23-9958	Eligible	Signature	Viewshed
CF-681	Scoville Substation Control House	1951	Yes	23-9951	Exempt	NA	Viewshed
NA	Scoville Substation	Ca. 1951	No	NA	Exempt	NA	Viewshed
NA	MFC Substation	Unknown	No	NA	Exempt	NA	APE
NA	Power Burst Facility (PBF) Substation	Ca. 1957	No	NA	Exempt	NA	Viewshed
PBF-602	Pump House (Well No. 1)	1955	Yes	23-10225	Exempt	NA	Viewshed
PBF-608	Electrical Substation Control House	1957	No	NA	Exempt	NA	APE
PBF-614	Pump House (Well No. 2)	1960	No	NA	Exempt	NA	Viewshed
PBF-622	CITRC Explosives Detection Research Center	1989	No	NA	Not Eligible	NA	Viewshed
PBF-623	CITRC Wireless Communications Support Building	1991	Yes	23-10235	Not Eligible	NA	Viewshed

Property ID	Name	Construction Date	Previously Recorded	Idaho Historic Sites Inventory Number	National Register Eligibility	Property Category	Potential Impact
PBF-632	Waste Reduction Operations Complex Office Building	1980	Yes	23-10236	Not Eligible	NA	Viewshed
PBF-638	Potable Water and Fire Water Pump House	1983	Yes	23-10239	Exempt	NA	Viewshed
PBF-TR-04	CITRC Project Support Trailer	2013	No	NA	Exempt	NA	Viewshed
PBF-TR-05	CITRC Project Support Restrooms	2013	No	NA	Exempt	NA	Viewshed

The MFC Substation (unknown construction date) and the Electrical Substation Control House (built in 1957), building PBF-608, are located within the current project APE. Neither building has been previously recorded or assigned Idaho Historic Sites Inventory numbers. The Cultural Resources Management Plan (DOE-ID, 2016) exempts these two buildings from listing on the NRHP, and the buildings require no further documentation or recording. Signature properties are historic properties having national level significance across the DOE complex. The Arco NPG Concussion Wall (CF-633) is a signature property within the viewshed of the current project APE. No effects are anticipated for this property (CF-633), because the proposed action mimics the existing transmission corridor and the historic industrial aesthetic of the cultural landscape.

4.1.4 Ecological Resources

Hafla et al. (2019) completed ecological surveys for vegetation and wildlife and summarized the results in the *Ecological Report for the Environmental Assessment for Expanding Capabilities at the Power Grid Test Bed at Idaho National Laboratory*. Surveys focused on areas of expected disturbance and an additional 2-mile buffer. Surveys searched areas having potential habitat in more detail than other locations. Plant community surveys occurred every 100 meters in areas in and adjacent to the new line and test pads. Hafla et al. (2019) surveyed 159 points for vegetation classification but reported on 137 vegetation points because the disturbed area changed. In addition, surveys mapped 10 noxious weed occurrences, 33 breeding bird survey points, and 102 wildlife locations. Survey locations are shown in Figure 8.

Surveys also evaluated ecological data from previous, unrelated projects in the general area. These analyses included reviewing aerial photos, topographic maps, and previously collected data to identify habitat for sensitive plants and wildlife.

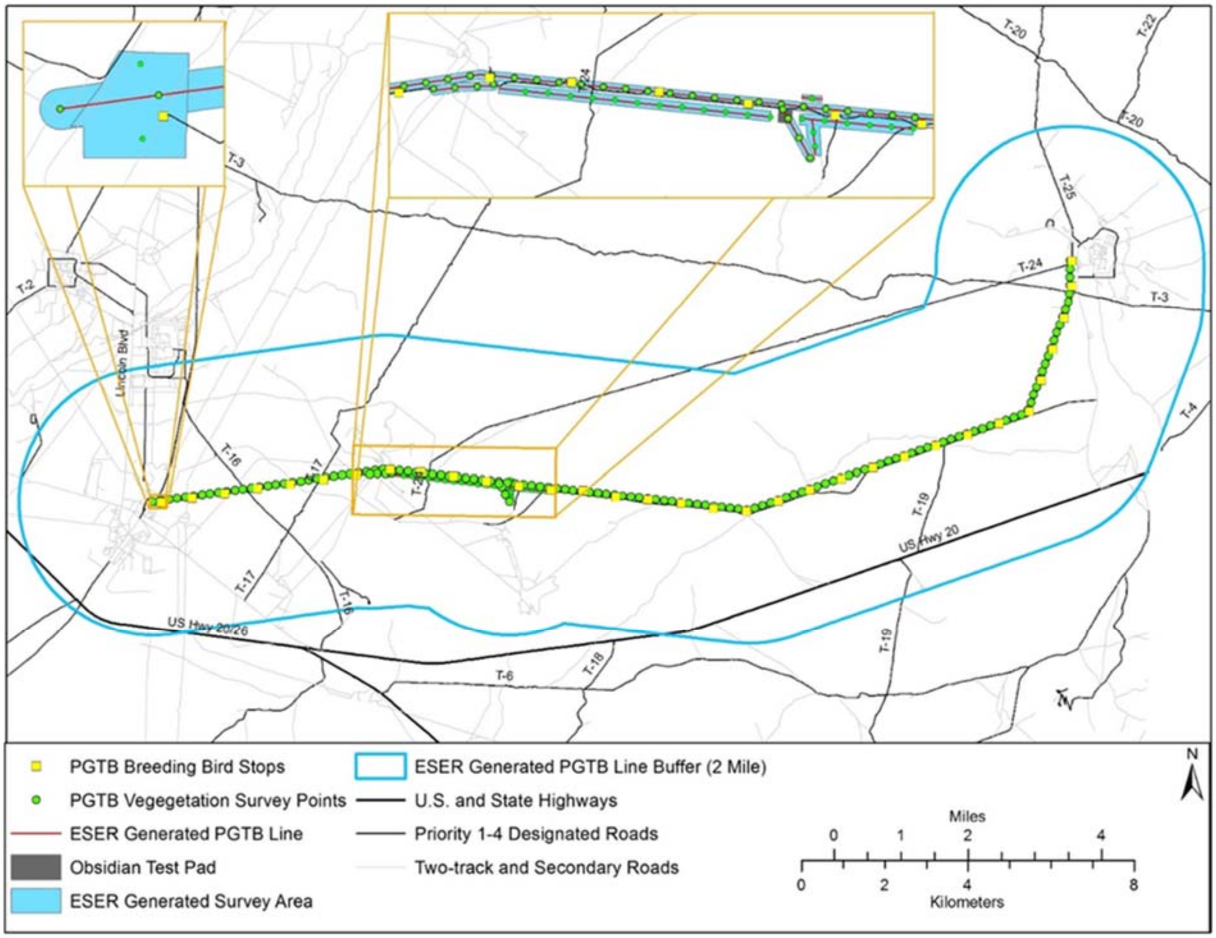

Figure 8. Survey locations for PGTB, including proposed line, line buffer, substation expansions, and test pad. Vegetation class sample points and project-specific breeding bird survey stops are included on this map.

The proposed action upgrades a lightly travelled section of T-25 (CITRC to MFC) paralleling the Haul Road. The existing power line runs between the two roads. Adding a second OHL increases cumulative effects of roads and fragmentation. The impacts of linear features on terrestrial ecosystems, such as the sagebrush steppe on the INL Site, include direct habitat loss; facilitated invasion of weeds, pests, and pathogens; and a variety of edge effects. Roads remove wildlife habitat. Constructing or improving linear features may limit long-term site productivity by exposing low nutrient subsoils, reducing soil water holding capacity, and compacting surface materials.

Linear construction projects, especially power lines and roads, impact species sensitive to habitat fragmentation. Roads significantly affect abiotic processes in ecosystems and change soil structure, aridity, erosion, and hydrology. Road construction often increases surface water flows, leading to erosion. Power line projects modify habitat and affect ecological communities and wildlife species in a variety of ways.

Erecting vertical structures in habitats with little or no natural vertical structure, such as sagebrush steppe and shrublands, creates the most obvious ecosystem modifications from power line construction. Power line construction presents several direct and indirect impacts to wildlife. Birds collide with structures and guy wires or conductors increase bird mortality in the absence of avian-safe construction methods. At certain voltages (generally less than 69 kV), energized power lines present an electrocution risk to birds. Power lines fragment avian habitat and indirectly cause altered movements and isolation from resources. Some open country avian species avoid habitats with changed visual character.

Roads have effects like power lines such as modified animal behavior (e.g., altered reproductive rates and displacement); changed physical geography (e.g., changes in surface runoff, erosion, and sedimentation, which effect aquatic and terrestrial animals); population changes from direct kills; spreading exotic species; and increasing human ecological impacts. Some species thrive in disturbed areas; however, these species are often weedy or nonnative and invade surrounding areas if not managed.

Vehicle noise disturbs wildlife, causing populations to relocate. While elk and deer adapt to busy highways, roads with continuous, slow-moving traffic cause displacement and changes in range use. Roads displace larger animals, but smaller animals suffer different effects. Because smaller animals are less noticeable and slower-moving, direct kills from motorized vehicles are common. In addition, even small roads block small animal movements and separate populations. Roads increase noxious weeds, which displace native forage. Construction practices consume land, causing habitat loss and fragmentation. Changing soil compaction, composition, and soil flora and fauna alters plant communities along roads.

Adding new manmade vertical structures benefits some wildlife but adversely affects others. Benefits include increased nesting, roosting, perching, and hunting opportunities in areas naturally lacking tall vegetation or nesting substrates. However, these features increase predation pressure on terrestrial prey species, such as small mammals, reptiles, perching birds living near the ground, and upland game birds.

Impacts to ecological resources are considered significant if they result in a loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship. Implementing the proposed action will result in the direct loss of vegetation and associated indirect impacts to habitat, soils, and wildlife, but will not cause loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship (Hafla, et al., 2019).

Impacts from the proposed action on specific ecological resources are detailed in Hafla et al. (2019) and summarized in the following subsections.

4.1.4.1 Plant Communities. Soil disturbance causes direct vegetation loss, fragments plant communities, and reduces habitat values. Indirectly, soil disturbance increases the introduction of weeds into adjacent undisturbed plant communities. Regular traffic and mowing cause native plant losses and weed invasions.

Low-lying playas supporting Great Basin wildrye plant communities contain the most at-risk soils in the project area. These soils are very fine and highly susceptible to wind erosion and invasion from non-native species. Project controls that reduce soil disturbance, restrict off-road vehicle traffic, and repetitive mowing reduce the direct loss and indirect increase in invasion by weedy annuals on and around the project site.

Vegetation removal and disturbance reduces habitat in the project area, which is more pronounced in good condition sagebrush habitat. In the CCA, DOE agreed to implement a "no net loss" of sagebrush policy across the INL Site. Based on vegetation maps, sagebrush dominates about 276 acres (44% of the vegetation) in the project area—including both the potentially disturbed area and 2-mile buffer area included in ecological surveys. To mitigate the loss of sagebrush and comply with DOE policy, the proposed action requires monitoring sagebrush disturbance and planting amounts equal to that disturbed in areas beneficial to sage-grouse. Assuming the proposed action disturbs the entire 276 acres of sagebrush, 276 acres of sagebrush would be planted in restoration areas identified in the CCA (DOE-ID & USFWS, 2014). This amount is a conservative estimate because the entire project area will not be disturbed.

The proposed action disturbs or clears vegetation within a maximum 200-ft-wide corridor along the length of the proposed power line (about 400 acres). Hafla et al. (2019) found that big sagebrush covers about 47% of 137 sampled locations along the proposed power line. Assuming all vegetation along the 200-ft-wide corridor (400 acres) were disturbed or cleared and 47% of that were sagebrush, about 188 acres of sagebrush restoration would be required.

Following construction, the disturbed corridor would be reseeded with native species and stabilized. About 30% of the soils in the project area have a high wind hazard and are not suitable for revegetation (Hafla, et al., 2019). Therefore, the impacts associated with failure to rehabilitate these areas would likely be permanent on about 68 acres of the 227 acres disturbed by the proposed action. Because the proposed action occurs in an area already heavily disturbed by roads and other infrastructure, this impact is less pronounced.

Vegetation would be temporarily replaced with selected native ground cover species on the remaining 158 acres; however, vegetation in these areas would eventually stabilize and return to pre-disturbance levels.

Invasive and Non-Native Species. Soil disturbance spreads invasive plants. Invasive and non-native plants are present along much of the T-25 road and around the edges of test pads and laydown areas. Mowing, blading, and other activities removing vegetation indirectly spreads invasive and non-native species. Construction activities in summer have a high probability for seed dispersal onto the project area and off-site transport of weed seeds.

Project controls that minimize soil disturbance and the likelihood of offsite dispersal into the project area (such as washing vehicles) reduce the potential for introducing invasive and non-native species. Failure to limit seed dispersal increases revegetation and weed management efforts. Weed control and prevention requirements at the INL Site are implemented through plan PLN-611, "Sitewide Noxious Weed Management" (INL, 2013).

Minimal impacts from invasive and non-native species from the proposed action are expected. Consistent implementation of previously identified measures and controls minimizes and avoids potential impacts from invasive and non-native species in the project area.

Sensitive Plants. Constructing the OHL and off-road vehicle travel during construction directly disturbs sensitive plant habitat and increases weed invasion risk. However, Hafla et al. (2019) did not observe sensitive plants in the project area, though appropriate habitat occurs. As currently described, the proposed action would have minimal effects on sensitive species.

Ethnobotany. Most species of ethnobotanical importance in the project area are common across the INL Site. The impacts of the proposed action are more pronounced for less common species than for abundant species. Removing several individuals from large populations will not greatly affect the species persistence but does affect using the area for harvesting seeds and vegetation.

4.1.4.2 Wildlife. Hafla et al. (2019) identified the following potential direct and indirect impacts to wildlife from implementing the proposed action:

1. Permanent and temporary habitat loss and associated wildlife species from disturbing soils and clearing vegetation
2. Nest abandonment or wildlife displacement from operations (e.g., equipment, materials, and testing)
3. Habitat fragmentation, increased fire frequency, and weed invasion
4. Disturbance and direct wildlife mortality from increased motor vehicle activity
5. Increased wildlife disturbance from increased human and wildlife interactions.

Wildlife impacts occur when habitats or individuals are disturbed or lost. The significance of impacts depends, in part, on population sensitivity. The proposed action has a greater potential to affect sensitive wildlife species than to affect general wildlife, because these species are generally less tolerant of environmental changes.

Relative to the size of the proposed OHL, habitat in the project area has already been lost or modified by constructing the existing power line and Haul Road. Given this, wildlife in the immediate project area consists of species supported by modified habitats and associated human activities. Wildlife highly sensitive to human disturbance has likely permanently moved away from the OHL corridor. Similarly, animals that tend to avoid openings will no longer use the corridor and animals that prefer openings will have their habitats somewhat improved through the proposed action.

Vegetation removal in the project area has the potential to affect wildlife. Individuals may be directly harmed and habitat may be lost, fragmented, or degraded. In addition, adverse impacts may occur from the direct loss of life through disruption of breeding, nesting, and consequent loss of eggs, chicks, or fledglings, through road collisions or through direct contact with mechanical equipment.

Immediately following vegetation removal, grasses and shrubs may be shorter than preferred by species such as elk and pronghorn. These impacts would be temporary and wildlife would utilize these areas again for fawning and grazing following recovery.

Construction activities and increased permanent infrastructure (e.g., test pads, road upgrades, and substation expansion) increase ground disturbance and habitat loss within the project area. New access roads, the new OHL, and improvements to T-25 increase linear features, weed species penetration, and fragment wildlife habitat.

Habitat fragmentation creates small habitat patches lacking the habitat attributes and characteristics characterizing more contiguous habitat. Fragmenting primary habitat hinders regional wildlife movements, potentially reduces interaction between individuals, and changes long-term population dynamics.

Some species benefit from habitat fragmentation. Many raptors hunt prey along habitat edges. However, reduced cover increases prey species vulnerability to predation. Pronghorn may still use areas for foraging, but fawning areas would be reduced.

Although suitable habitat for sage-grouse occurs in the project area, minimal direct impacts to sage-grouse are anticipated due to limited disturbance in areas having habitat and the distance from known leks to developed areas.

Constructing the existing OHL and Haul Road disturbed and degraded habitat in the project area to varying degrees. The proposed action may result in a harder habitat edge and somewhat greater habitat fragmentation.

Construction disturbs wildlife in and adjacent to the project area. Wildlife inhabiting the project area would be displaced during power line construction as vegetation is removed and soil is disturbed. Displaced wildlife would most likely occupy adjacent habitat. Following revegetation and stabilization activities, some of the displaced wildlife would return to new habitat within the project area.

Larger wildlife species moving through the project area would be temporarily disturbed during construction activities but would most likely continue using the area for foraging and migration, following reseeding and stabilization activities.

Pole structures and lines would utilize designs that minimize risk of injury or electrocution to nesting, roosting, or flying birds so that effects from the energized lines are minimized. No significant impacts from the proposed action are expected. Consistent implementation of previously identified measures and controls minimize and avoid potential impacts to wildlife species in the project area.

Increased motor vehicle activity from PGTB testing activities, routine road and power line maintenance, and new use of the Haul Road would not result in major disruptions to wildlife or increases in wildlife mortality, because the proposed action is located mostly within an existing road and utility corridor where vehicle use and routine road and power line maintenance activities regularly occur.

4.1.5 Soils

Erosion is the natural process by which water or wind removes soil from its natural location. Vegetation removal impacts soils by increasing exposure of susceptible soils to water or wind erosion at the land surface. While bare-ground conditions would not be a typical result of the proposed action (except for at test pads, parking areas, and similar areas), in isolated areas, erosion could result in a degradation of the land surface and reduced long-term soil productivity through loss of topsoil material.

The greatest potential impact to soils occurs during initial vegetation removal, when mechanical and manual methods clear vegetation as described in Section 4.1.3. As vegetation is removed, it would be dispersed across the OHL corridor. Applying this debris to the cleared land surface assists in mitigating impacts to soil resources by intercepting rainfall, limiting impact erosion, and slowing surface runoff.

For areas having moderate and severe erosion hazards, appropriate and effective implementation of project controls would mitigate adverse effects to soil resources within the project area.

4.1.6 Human Health

The proposed action is not anticipated to adversely affect worker or public health. Of the hazards identified, biological effects from low-strength, low-frequency EMF could pose a potential human health risk from implementing the proposed action. No federal regulations have established environmental limits on the strengths of fields from power lines.

In the area of biological effects and medical applications of non-ionizing radiation, such as EMF, about 25,000 articles have been published over the past 30 years. Scientific knowledge in this area is more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the World Health Organization concluded that current evidence does not confirm the existence of any health consequences from exposure to low-level EMFs (World Health Organization, 2019). Therefore, health effects from EMFs are not expected.

4.1.7 Intentional Destructive Acts

Power supplied by the proposed action is redundant to that already supplied; therefore, no effects to power supplies would occur if the proposed new OHL were intentionally damaged. However, destructive acts to proposed facilities could cause environmental effects. Severed transmission lines could result in wildfires or release chemical or hazardous materials into the environment.

Environmental impacts from attacks to the new OHL would most likely cause localized effects resulting from damage and destruction of towers and efforts to mitigate the impact by repairing and reconstructing the damaged infrastructure. Large-scale regional impacts could result, for example, from wildfire if the act resulted in a secondary effect, such as wildfire ignition during particularly dry periods.

The proposed project would present an unlikely target for an act of terrorism and would have an extremely low probability of attack. Fences, gates, and barriers, coupled with using keying systems, access card systems, and security personnel at entry points, restricts access to the INL Site and project area. Using these physical obstructions and warning signs effectively deters and delays intruders. Personnel identification and control measures such as photo IDs, visitor passes, and contractor IDs help quickly identify unauthorized persons within the INL Site.

In addition to physical security, the proposed project would be protected against cyber threats (i.e., hackers attacking computer control systems and information). Access to control systems would be managed to protect critical assets and information and maintain electric infrastructure reliability. This includes logical access (user password protection) to computers and networks and physical access to computer rooms. Policies and procedures manage authorization and authentication and monitor logical and physical access. Firewalls would be implemented and proactively maintained.

The proposed action would not constitute an attractive target for vandalism, sabotage, or terrorism, because the facilities would be difficult to damage and the impact from any successful act would be negligible both from a practical and political perspective. Because the proposed action presents an unlikely target for an act of terrorism, the probability of an attack is extremely low.

4.1.8 Cumulative Impacts

Cumulative impacts result "from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions." The impacts of past and present actions form the affected environment considered in Section 3.

Cumulative impacts can result from individually minor, but collectively significant, onsite or offsite actions occurring over time (40 CFR 1508.7). Those actions within the spatial and temporal boundaries (i.e., project impact zone) of the proposed action are considered in this EA. The spatial and temporal boundaries vary depending on the type of action proposed. The area potentially affected was determined by the scope of the proposed action, including all potential direct and indirect impacts associated with project activities. To account for all project activities, the project area covers 983 acres along the length of the proposed OHL from CFA to MFC and a 2-mile buffer area for ecological resources, including a power line, road upgrade, laydown areas, substation expansions, new test pad(s), and expansion of existing test pads. The area also incorporates post-construction activities, such as the potential for increased use of the existing OHL for power line testing activities, routine and emergency maintenance, and access road upgrades.

Because adverse effects from the proposed action to human health and from intentional destructive acts are negligible, they do not contribute to cumulative impacts and are not discussed in this section.

Moderate growth is anticipated at the major INL Site locations with more office and laboratory facilities at Idaho Falls locations. Recent changes in land use at the INL Site include expanding the Naval Reactors Facility boundary; constructing the Remote-Handled Low-Level Waste Disposal Facility; and establishing the Water Security, Wireless, and Smart Grid Test Beds. DOE is also analyzing the environmental impacts from expanding operations at the NSTR and the Radiological Response Training Range (RRTR).

While NSTR and RRTR expansion is not anticipated to disturb locations within the cumulative impact analysis area for expanding PGTB, the project has the potential to disturb a large amount of undisturbed land at the INL Site. NSTR is the closest to PGTB and is located about 7 miles north of MFC in an area mostly devoid of sagebrush due to the 2010 Jefferson Fire. The loss of sagebrush from the Jefferson Fire was factored into the amount of sagebrush habitat in the CCA (DOE-ID & USFWS, 2014). The proposed action is located mostly within an existing utility corridor outside of the undisturbed core of the INL Site. Therefore, impacts from the proposed action and expanding the NSTR and RRTR are not anticipated to be cumulative.

In addition, the CCA (DOE-ID & USFWS, 2014) established habitat and population triggers to guard against sage-grouse declines. The habitat trigger would be tripped if more than 20% of sagebrush habitat within the sage-grouse conservation area is lost or converted to a non-sagebrush-dominated vegetation class. If a net 38,983 acres of sagebrush habitat were lost, DOE and the USFWS would follow procedures outlined in the CCA to determine the cause and develop new conservation measures. As noted above, the proposed action has the potential to disturb 276 acres of sagebrush which is 0.71% of the habitat trigger. The proposed action combined with other activities at the INL Site would not result in the loss of sagebrush in quantities that would require developing new conservation measures to address the habitat trigger in the CCA.

The following subsections summarize cumulative impacts that can be meaningfully evaluated at the present time.

4.1.8.1 Air Quality. The main priority pollutants from the proposed action are carbon monoxide and particulate matter from vehicle emissions and fugitive dust, respectively. Carbon monoxide is the primary contributor from vehicle exhaust and particulate matter is the primary contributor from land disturbance. The proposed action contributes only a small amount of these pollutants and mainly on a short-term basis during the construction phase; however, it would add temporarily to the cumulative effect within the project area if multiple activities occur simultaneously. Most of this pollutant load is due to vehicle and equipment use and wind blowing across disturbed land during construction activities. Project controls minimize these effects. Construction-related emissions and long-term operational emissions from testing and maintenance activities associated with the proposed action would be negligible and would not make a cumulatively significant contribution to air quality effects.

4.1.8.2 Cultural Resources. The road upgrades and increased use and maintenance resulting from the proposed action and other INL Site developments impact the ability of managers to maintain land for preservation, natural habitat, or other mission needs. For example, facility use approved at CITRC for one program precludes use by other programs.

Infrastructure developments in the project area to support PGTB activities have been ongoing since 2003. Manmade infrastructure cumulatively impacts visual resources by introducing contrast to the landscape. Normally, the first constructed objects in a natural setting causes the most noticeable change because of the contrast of form, line, color, and texture with the surroundings.

The significance of the cumulative impact depends on the level of visual contrast between the existing surroundings and the proposed action and whether the scenic quality of the surroundings would be diminished. The proposed action is located mostly within an existing utility corridor, thus limiting impacts to an area that is already disturbed. The proposed action, in conjunction with the other projects discussed above would not significantly contribute to the magnitude of visual resource effects in the project area.

Upgrading the T-25 road minimizes off-road travel that occurs when road quality is poor, such as during wet and muddy conditions. While the proposed action could result in increased vehicle use from using and maintaining the new OHL, the new OHL requires less maintenance than the existing line. Therefore, the increased vehicle traffic and associated personnel access will not be significant.

4.1.8.3 Ecological Resources. Cumulative effects on ecological resources are generally additive and proportional to the amount of ground disturbance within specific habitat areas. The proposed action may potentially impact sensitive species. Sensitive species at the INL Site are discussed earlier in Sections 3 and 4 of this EA. Project controls lessen or eliminate potential cumulative impacts to ecological resources. Most of the discussion in this section is taken from Hafla et al. (2019).

Long-term impacts to plants and animals can be attributed to fragmentation caused by new access roads. The botanical and wildlife habitat at the INL Site is fragmented by new development. Opening areas to increased vehicular access causes direct and indirect impacts. Increased human and wildlife interactions, vehicle collisions, and spread of noxious weeds can result. The proposed road improvements and creation of temporary roads, when combined with road effects from past, present, and reasonably foreseeable actions, reduces the continuity of open and undeveloped land at the INL Site.

Future actions include resurfacing and reconstructing primary roads that are part of INL Site’s 120 miles of improved roadways and about 60 miles of unimproved roadways. Resurfacing, reconstructing, and maintenance of primary roads at the INL Site will continue for the foreseeable future. Traffic along INL Site roads will increase if employment grows as planned. Impacts from these activities would be like those already occurring at the INL Site as reflected in the current environmental setting. Future activities contributing to major increases in traffic require a separate NEPA evaluation.

The proposed action is located mostly within an existing utility corridor. Relative to the size of the proposed OHL, a significant amount of habitat in the project area has already been lost or modified over the years through construction of the existing power line and construction of the Haul Road. Consolidating similar linear features (i.e., power lines and roads) in this manner reduces cumulative effects. In addition, by implementing project controls, the incremental effects of the proposed action would not be significant.

4.1.8.4 Soils. Construction activities during project implementation involve grading and excavation along the new OHL route, spur routes, T-25 road, and for test pad expansion and construction. About 30% of the soils in the project area have a high wind hazard and are not suitable for revegetation. The impacts associated with failure to rehabilitate these areas would likely be permanent.

However, the effects of the proposed action related to sensitive soils would be localized; there are no other planned projects with which the effects of the proposed action would combine to result in cumulative hazards. Therefore, the proposed action would not make a significant contribution to any cumulative impact related to soil resources.

The cumulative effects of the proposed action along with past, present, and reasonably foreseeable actions on the INL Site are anticipated to be negligible. Past activities in this area installed a power line and the Haul Road. However, most land in the area has remained unchanged and is not expected to change due to implementing the proposed action. Project activities, such as travel on T-roads, vegetation removal, soil disturbance, and other disruptive activities have the potential to affect resources in the project area. However, from a cumulative impact perspective, the incremental impacts of the proposed action when added to past, present, and reasonably foreseeable actions at the INL Site are likely not significant. Considering the widespread nature of INL Site facilities and pristine conditions on most of the Site, the cumulative impacts of the proposed action are likely small.

Directives, orders, guides, and manuals are DOE’s primary means of establishing policies, requirements, responsibilities, and procedures for DOE offices and contractors. Among these are a series of orders directing each DOE site to implement sound stewardship practices that are protective of the public and the environment. Future development and operations at the INL Site, combined with past and present operations, will continue to comply with regulatory limits.

4.2 No Action Alternative

4.2.1 Air Quality

Under the no action alternative, no new facilities would be constructed. Therefore, the no action alternative would have no impact associated with air emissions. Other projects in the project area would likely result in cumulative increases in air emissions associated with increased traffic and development, but the no action alternative would not contribute to these emissions. Therefore, the no action alternative would have no direct or indirect impacts on air quality.

4.2.2 Cultural Resources

No ground-disturbing activities would occur as a result of this alternative. Consequently, no indirect or direct impacts on cultural resources would occur.

4.2.3 Ecological Resources

4.2.3.1 Plant Communities. The no action alternative would result in no changes to plant communities, or wildlife habitats in or near the proposed project site. Therefore, no impacts would occur relating to invasive and non-native species, sensitive plants, and species of ethnobotanical concern. The no action alternative would not conflict with the CCA regarding sagebrush disturbance, nor would it substantially degrade the quality of the environment.

4.2.3.2 Wildlife. The no action alternative would result in no changes to existing facilities, plant communities, or wildlife habitats in or near the proposed project area. Therefore, no impacts would occur to special-status species or their habitats or other sensitive habitats. In addition, movement corridors for wildlife would not be adversely affected. The no action alternative would not conflict with any federal or state policies or regulations protecting biological resources, nor would it substantially degrade the quality of the environment.

4.2.4 Soils

Under the no action alternative, no new facilities would be constructed. Therefore, the no action alternative would have no impact associated with soil erosion.

4.3 Summary of Environmental Consequences

Table 14 provides a summary of the environmental consequences that would result from the no action and proposed action alternatives for air, cultural, ecological, and soil resources.

Table 14. Summary of environmental consequences.

Resource	No Action Alternative	Proposed Action
Air	The no action alternative would have no impact associated with air emissions.	Air quality impacts from implementing the proposed action caused by mobile emissions sources used to conduct project activities (including maintenance and testing) and ground disturbance would be minimal and localized and would not cause changes to regional air quality. In addition, the long-term operation and maintenance of the project would not result in any nonpermitted sources of toxic air emissions. Because of the limited nature of construction activities and use of project controls (e.g., applying water to disturbed areas), air quality impacts would be negligible.
Cultural	No ground-disturbing activities would occur as a result of this alternative. Consequently, no indirect or direct impacts on cultural resources would occur.	The proposed road upgrades to T-25 could adversely affect five sites that are bisected by the T-25 road. Two of these five sites were determined eligible to NRHP. The remaining three sites bisected by T-25 were concurred on to be potentially eligible for NRHP under Criterion d. Consultation should lead to agreement on appropriate strategies to mitigate adverse effects of the proposed action.
Ecological	The no action alternative would result in no changes to plant communities or wildlife habitats in or near the proposed project site. Therefore, no impacts would occur relating to invasive and non-native species, sensitive plants, and species of ethnobotanical concern.	Implementing the proposed action will result in the direct loss of vegetation and associated indirect impacts to habitat, soils, and wildlife, but will not cause loss of protected or sensitive species or loss of local populations from direct mortality or diminished survivorship. The impacts from failure to rehabilitate sensitive soils would likely be permanent on about 68 acres of the 227 acres disturbed by the proposed action. Because the proposed action occurs in an area already heavily disturbed by roads and other infrastructure, this impact is less pronounced. Vegetation would be temporarily replaced with selected native ground cover species on the remaining 158 acres. In the CCA, DOE agreed to implement a "no net loss" of sagebrush policy across the INL Site. Assuming the proposed action disturbs the entire 276 acres of sagebrush

Resource	No Action Alternative	Proposed Action
		in the project area, 276 acres of sagebrush would be planted in restoration areas identified in the CCA (DOE-ID & USFWS, 2014). This amount is a conservative estimate because the entire project area will not be disturbed. Assuming all vegetation along the 200-ft-wide corridor (400 acres) were disturbed or cleared and 47% of that were sagebrush, about 188 acres of sagebrush restoration would be required. The disturbance of 276 acres of sagebrush is 0.71% of the habitat trigger. The proposed action combined with other activities at the INL Site would not result in the loss of sagebrush in quantities that would require developing new conservation measures to address the sage-grouse habitat trigger in the CCA.
Soils	Under the no action alternative, no new facilities would be constructed. Therefore, the no action alternative would have no impact associated with soil erosion.	Soils with high erosion potential resistant to reseeding make up about 30% of the project footprint. The impacts associated with failure to rehabilitate these areas would likely be permanent on about 68 of the 227 acres disturbed by the proposed action. Because the proposed action occurs in an area already heavily disturbed by roads and other infrastructure, this impact is less pronounced. The effects of the proposed action related to sensitive soils would be localized; there are no other planned projects with which the effects of the proposed action would combine to result in cumulative hazards. Therefore, the impacts to soils from the proposed action would be minimal.

Other issues evaluated were determined to have a little or no effect on the environment.

5. COORDINATION AND CONSULTATION

Shoshone-Bannock Tribes

DOE briefed Heritage Tribal Office representatives on May 8, 2019 on the PGTB EA and project, and the Fort Hall Business Council on May 21, 2019.

DOE provided the PGTB cultural resource investigation report (INL/LTD-19-53218) to the Tribes for review and comment on March 28, 2019. DOE provided formal Notice of Adverse Effect to the Tribes on April 10, 2019 with an invitation to the Tribes to participate in developing a MOA for mitigations of the adverse effects. DOE briefed the Tribes' staff on the PGTB EA and project on May 8, 2019, and the Fort Hall Business Council on May 21, 2019.

DOE briefed the Heritage Tribal Office on the cultural resource evaluation for the PGTB Project during several regularly scheduled Cultural Resource Working Group meetings from May 2017 through April 2019. Members of the Office also participated in field surveys performed within the project area of potential effect during 2018.

Idaho State Historic Preservation Office

DOE performed National Historic Preservation Act Section 106 consultation with the Idaho State Historic Preservation Office (SHPO). DOE briefed the Idaho SHPO on June 6, 2018, October 10, 2018 and January 31, 2019. DOE provided the PGTB cultural resource investigation report (INL/LTD-19-53218), including a finding of adverse effect, to the Idaho SHPO for review on March 28, 2019. On April 8, 2019, DOE received concurrence from Idaho SHPO on the determination of adverse effect and initiated consultation on mitigation measures.

Advisory Council for Historic Preservation

On May 14, 2019, DOE submitted a Notice of Adverse Effect to the Advisory Council for Historic Preservation and invited the Council to participate in a MOA to mitigate adverse effects.

INL Oversight Office

DOE briefed Erick Neher (state of Idaho's INL Oversight Office Manager), his staff, and Mark Clough (Idaho DEQ) on the PGTB EA and project on May 8, 2019.

Congressional

DOE briefed staff members of Sen Risch, Sen Crapo, and Congressman Simpson on May 9, 2019.

Idaho Department of Environmental Quality

DOE briefed staff from the Idaho Department of Environmental Quality on the proposed action and EA on May 8, 2019.

6. REFERENCES

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Appendix A
Power Line Construction Activities

Appendix A
Power Line Construction Activities

The proposed action constructs a reconfigurable 138-kV electrical transmission line for PGTB to create a multi-utility interconnected grid for simultaneous testing of loads, generation, and storage. The proposed 138-kV OHL is about 16.5 miles long and connects to the Scoville Substation at CFA, routes through the CITRC area, and ends at MFC. The new OHL minimizes outages to the normal electrical power supply to the CITRC area created by testing.

Proposed activities include (1) constructing the power line using heavy equipment, laydown areas for staging equipment and initial pole assembly, and new test locations on the existing OHL; (2) expanding existing test pads to accommodate parking areas and defensible space; (3) constructing new test pads; and (4) expanding the CITRC substation to allow new power infrastructure tie-ins. Post-construction activities involve power line testing activities on the new OHL, routine and emergency maintenance, and access road upgrades. These activities have the potential to impact about 983 acres at the INL Site (Holmer, Henrikson, & Olson, 2019).

The proposed action expands the Scoville substation yard and constructs new test pads. Construction requires clearing and grubbing vegetation, backfilling with pit-run gravel, installing ground grids, placing substation gravel base, and installing fencing. It also includes enlarging established test pads, installing fiber optic cable on the new poles, and locating equipment laydown areas and construction parking areas in disturbed areas or as close as possible to disturbed areas and the construction work. Appendix B shows the preferred locations in detail.

The old and new power lines both support testing activities; the new OHL also supplies power to INL Site facilities. Future testing on the new and reconfigured test pads includes installing equipment such as diesel generators, 138/13.8-kV transformers, SF_6 gas-filled circuit breakers, switchgear, load banks, instrumentation, and battery trailers at test locations on a temporary basis. The temporary arrangement allows user reconfiguration for different test scenarios.

Power Line Design

A majority of the proposed OHL would be constructed from about 300 single, raptor-safe, ductile iron poles. Pole spacing is about 300 ft. However, there are possible exceptions due to engineering and site conditions. For example, wood-pole H-frame structures offer an increased span length from the single pole structures and may be used in some areas.

Concern regarding avian electrocutions on transmission lines led APLIC to develop avian-safe (or raptor-safe) design guidelines (APLIC, 2006). These standards have been met or exceeded in “BEA Power Management Avian Protection Plan and Bird Management Policy” (INL, 2016). The design features minimize the potential for avian electrocutions on the transmission lines.

Ductile iron poles require less maintenance than wooden power poles due to resistance to rot, insects, and fire. Ductile-iron poles are made up of over 90% recycled material and are 100% recyclable. For embedded protection, a ceramic epoxy coats the pole bottoms to prevent pole constituents leaching to soil.

Power Line Construction

This section describes typical construction methods for OHLs, substation construction and alteration, and temporary construction work areas. The process for bringing personnel, materials, and equipment to each power pole site, installing the foundation, erecting the support structure, and stringing the conductors can vary at each segment or at any structure site.

Access to Pole Sites. Prior to construction, crews stake and flag the OHL corridor (measuring about 100 ft out from each side of center) by placing a stake in the ground at each structure location. The Haul Road and T-25 power line road run adjacent to portions of the new OHL corridor and give access to most new pole locations.

Constructing the proposed power line requires driving from pole to pole to install the new poles and lines. In areas where accessing new pole locations cannot be accomplished by driving a straight line from the previous location, crews access the next location by returning to the T-25 power line access road.

Passenger vehicles park along the T-25 power line access road in designated parking areas that will be clearly marked in previously disturbed areas.

Off-road vehicle access along the 16.5 miles of OHL route disturbs about 400 acres of land (200 ft wide or 100 ft each side of center line) on the INL Site (16.5 miles = 87,120 ft x 200 ft wide = 17,424,000 ft^2 = 400 acres). Because the route follows the established 138-kV OHL with about 125 ft offset, some of the area has been previously disturbed. An area about 200 ft around each pole will be permanently disturbed for pole installation and future maintenance. The remaining area between poles is considered temporary disturbance and will be revegetated.

In addition, the proposed action has the potential to create about 7 miles of temporary spur routes (assuming a 125-ft offset from the existing line or nearest road to each of the 300 new pole locations) for equipment turn around and to access the Haul Road and T-25 road. Crews blade and mow spur routes measuring about 14 ft in width, which also have the potential to disturb an additional 12 acres. Exact locations for spur routes cannot be defined until final project design. However, the amount of potential disturbance is conservative, because it assumes each pole requires a new 125-ft × 14-ft spur route, while the project anticipates most poles can be installed from established roads and equipment can turn around in the 200-ft radius area of disturbance around each pole.

Installing Poles. Prior to installing poles, crews clear vegetation at each site by removing large vegetation, including larger shrubs such as sagebrush, from temporary access routes and within the wire zone to avoid interference with equipment operation or posing a safety threat. The wire zone is the portion of the OHL corridor that extends 10 ft out from either size of the wire(s). Grasses, forbs, sagebrush, and other native and non-native species compose the vegetation within the OHL corridor. Crews use chainsaws and mowers to remove vegetation, which is then scattered within the corridor. Removed vegetation is scattered within the corridor outside the wire zone.

Construction crews install pole structures on a priority basis rather than in sequential order. The construction sequence may be altered due to weather, wildlife timing restrictions, or other factors. Backhoes, track hoes, or augers excavate holes about 2 ft in diameter and about 10 to 11-ft deep for pole embedment. The proposed action does not include blasting. Rock drills bore holes in rock where necessary. Crews direct-bury the ductile iron poles. Installing poles may require placing reinforcing steel or an anchor bolt cage in pole foundations.

Typical structure installation at each pole location involves short-term surface disturbance of an area about 200 ft in diameter around each structure. Short-term disturbance areas are areas disturbed in conjunction with construction then rehabilitated at the completion of construction. Beginning with staking and flagging of the route (described above), through stabilization and rehabilitation, intermittent activity along the OHL route occurs over the 15-month construction period.

After installation, each pole in the ground constitutes permanent disturbance. A permanent change in the type of vegetation around each pole is anticipated from continued disturbance associated with future pole maintenance. The permanent changes consist of an area about 31,416-ft^2 with the pole in the center. Total permanent disturbance associated with the presence of 300 poles would be about 216 acres.

Pole Erection. Construction crews use ground equipment to erect poles. Semi-trucks deliver poles to each site and crews assemble poles onsite using a small, truck-mounted crane or boom truck. Rubber-tired or track vehicles haul structural components (e.g., poles, insulators, hardware, etc.) to the pole locations; the vehicle used depends on the type of equipment needed, type of access available, and local site conditions.

Typical poles have three horizontal post insulators supporting one circuit. Linemen bolt insulators to the pole. After assembly, equipment lifts and sets the pole in pre-drilled holes. Crews then tamp excavated material back in the hole to secure poles.

Installing the new 138-kV ductile iron poles requires about a 200-ft diameter work space (100 ft from the pole in each direction). These work spaces furnish safe work areas for equipment, vehicles, and materials during pole installation and maintenance and are considered permanent (about 216 acres for 300 poles). The proposed action restores work space not required for safe operation and maintenance to pre-construction conditions following project completion.

Pull and Tension Sites and Reel Sites. When structures are in place, crews string conductors by laying a pulling line, or sock line, along the route using a light vehicle (where there is vehicular access within the corridor) or by hand. Ground crews place the sock line in pulleys on each structure at the conductor location.

Installing the OHL requires about five distinct pull and reel sites (not including locations where crews use substations or structure sites for stringing) to aid stringing the conductor. Final project design determines the location of pull and reel sites within the OHL corridor; however, in general, power line construction requires pull and tension sites every 1 to 4 miles. The size of a pull and tension site varies with space availability, but 800 ft by 100 ft is typical. The number and location of pull sites varies based on segment alignment, topography, and span lengths between poles. In general, OHL construction locates reel sites (also about 800 ft by 100 ft in size) opposite pull and tension sites. Construction crews use pull and tension and reel sites to set up tractors, reel trailers, and trucks with tensioning equipment.

The proposed action locates pull and tension and reel sites within already disturbed areas when possible (see Appendix B). Final design may require locating some sites at undisturbed locations. Depending on topography, some pull and tension sites may require minor grading to create level equipment work areas.

Pulling and reeling stations disturb about 9.2 acres total if all are in undisturbed areas. These pulling stations would also be used as parking and turn-around pads.

Construction Equipment and Personnel. Constructing the new OHL requires about 20 people per day to construct the proposed line. Line crews string the conductor, ground crews work on OHL pole construction and preparation for stringing, and grading crews prepare the pole sites. Typically, the grading crews prepare each pole site and the foundation crews work on the poles prior to stringing activities. Foundation crews and stringing crews sometimes work on different sections of the OHL at the same time to complete construction over a shorter period. Multiple foundation crews and grading crews also work at different pole sites at the same time.

Equipment and vehicle types include pickup trucks, bucket trucks, rubber-tired or track-mounted augers, cranes, flatbed reel trucks, off highway vehicles, and tractor trailers. Construction includes three to seven vehicles in or around pole location sites or in the OHL corridor at any time. During project activities, crews park vehicles and locate material stockpiles within the OHL corridor on disturbed areas (i.e., access routes, pole locations, and substations). Crews establish staging areas and parking areas in disturbed areas or as close as possible to disturbed areas and construction work.

Diesel fuel, gasoline, engine oil, hydraulic oil, and antifreeze in mobile equipment are the only hazardous material liquids proposed for use during construction and maintenance. No toxic or hazardous substances would be stored in the OHL corridor or generated during maintenance. Toxic or hazardous substances used in conjunction with the project would be stored at CFA and equipment laydown area.

The proposed action requires rehabilitating areas of temporary disturbance, including temporary spur routes, in accordance with the project controls.

Test Pad Construction and Expansion

Constructing test pads requires clearing, grubbing, and backfilling the test pad with pit run gravel. Construction includes installing a ground grid and finishing the pad with crushed gravel. The proposed action constructs the Scoville test pad and expands the test pads at CITRC and IML; gravels and fences the CITRC, IML, and MFC test pads; and designates parking locations at each. The proposed action also installs an additional power pole at the CITRC test pad.

The proposed Scoville test pad measures about 100 ft × 100 ft (10,000 ft^2). However, the size increases when adding defensible space for fire protection. Assuming defensible space around each test pad measures 50-ft wide, the footprint increases to about 22,500 ft^2. Expanding the CITRC and IML test pads covers areas already receiving use. Fencing the CITRC, IML, and MFC test pads and designating parking at each to limit unauthorized expansion of disturbed areas.

Substation Expansion

The proposed action expands the Scoville substation to add the new transmission line by modifying the bus to allow isolating the test line from the rest of the system. This requires expanding the ground grid, extending the bus to the north, and positioning a new bay for the new production line. The proposed action also adds controls inside the substation control building. The proposed expansion occurs within the CFA facility boundary on previously disturbed ground.

Yard Modifications. The proposed action extends the Scoville substation yard northeast in the area north of the 138-kV yard and east of the Rocky Mountain Power 69-kV yard and enlarges the Scoville substation yard to accommodate new additions.

Extending the east and west busses north creates room for constructing a new bay, with the new 138-kV OHL connecting to the east bus. The existing 138-kV line to CITRC exits Scoville at an angle, which requires the busses be extended. The proposed action constructs new bus extensions like the old. The circuit breaker uses SF_6 as an insulating medium. A thermostat regulates the tank heater.

Yard modifications include expanding the substation ground grid and fence to include the new addition. The new fence has the same number of access gates in similar locations as the old. The fence meets the Institute of Electrical and Electronics Engineers grounding requirements.

Scoville Substation One-Line. Figures A1 through A4 provide an overview of the proposed modifications to the Scoville Substation One-Line. The proposed action moves the existing 138-kV line from Scoville to CITRC to the west bus, connects 8B1-10 between 8B1-5 and 8D1-10, moves several bus jumpers, and modifies control circuitry. The modification requires moving currents from 8B1-10 to 8R1-E-387 from 8R1-E-387 to 8R1-W-387 and moves the trips from 8R1-E-387 and 86-5 to 8B1-10 to 8R1-E-387 and 86-2. The proposed action also adds new line potential transformers to the line side of 8H1-11 and wires secondary potentials to 8R1-311L-E1, 8R1-311L-E2, and 8M1-10.

The new line connects directly to the east bus in the east bus differential zone. The line side circuits connect to 8R1-E-387. The bus side circuits connect to new 8R1-311L-E3 and 8R1-311L-E4 relays and 8M1-11 meter, inside the control building. Trips to 8B1-11 connect to 8R1-311L-E3, 8R1-311L-E4, 8R1-E-387, 86-5, the control switch in the control building, and the remote terminal unit. 86-5 furnishes the block close to 8B1-11. The close to 8B1-11 connects to the control switch in the control building and the remote terminal unit. The control logic to 8B1-11, 8H1-33, and 8H1-34 is like the control logic to 8B1-10, 8D1-9, and 8H1-11, respectively.

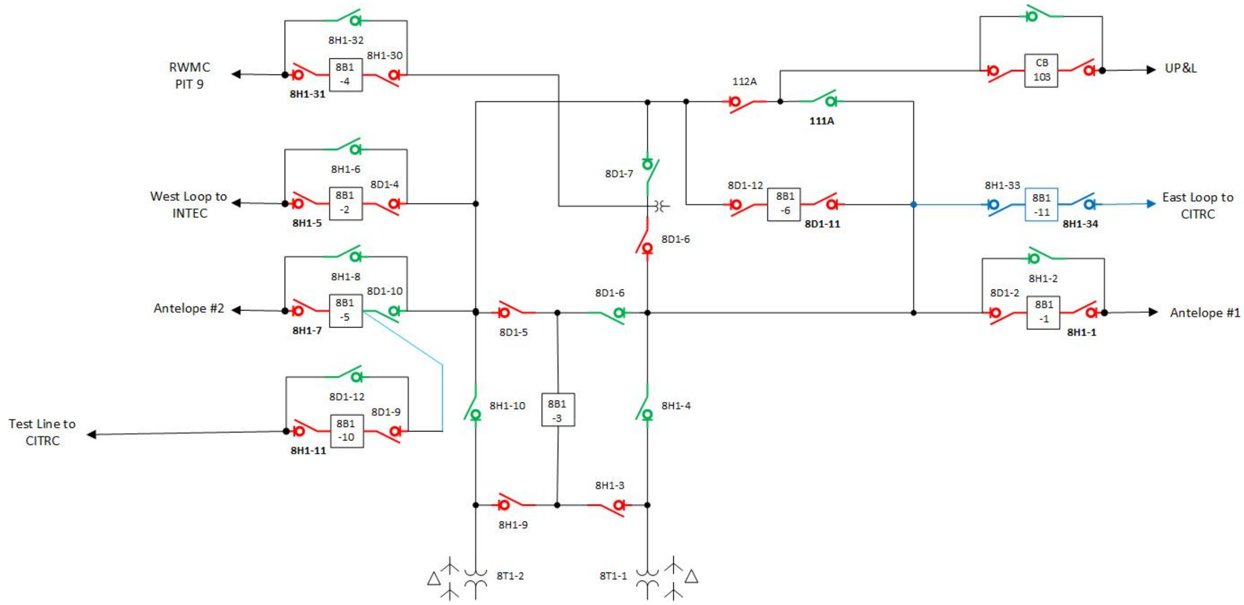

Figure A1. Scoville One-Line overview.

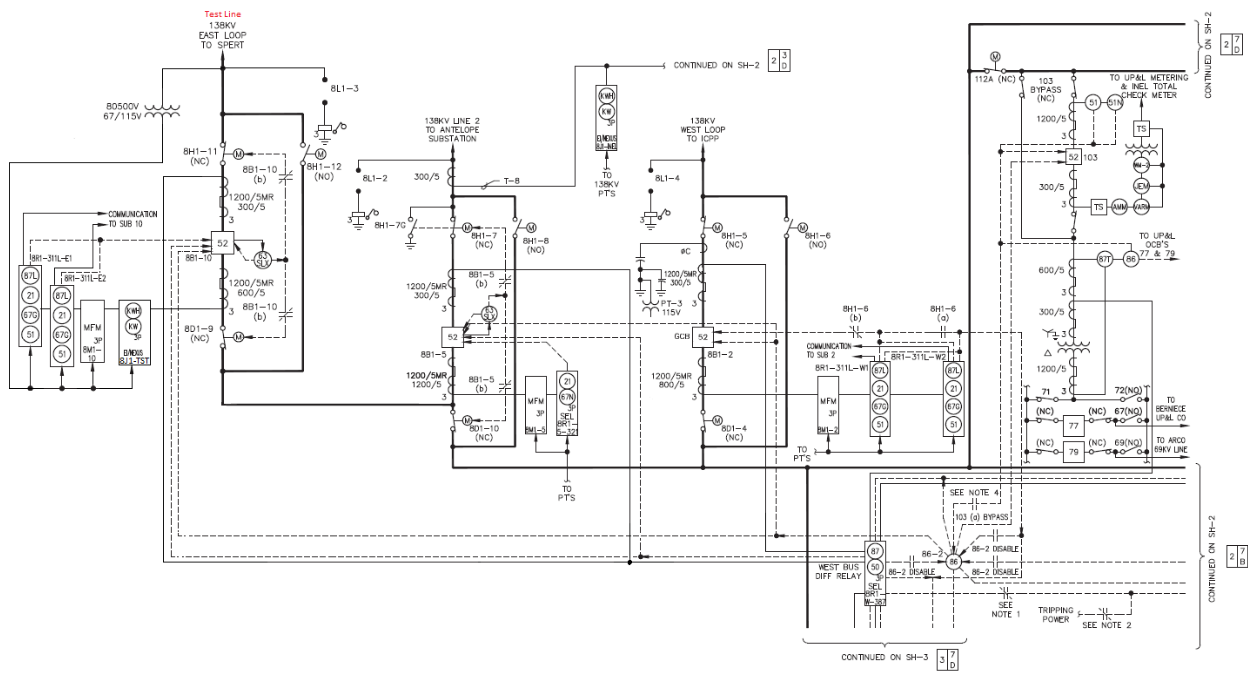

Figure A2. Scoville One-Line detail 1.

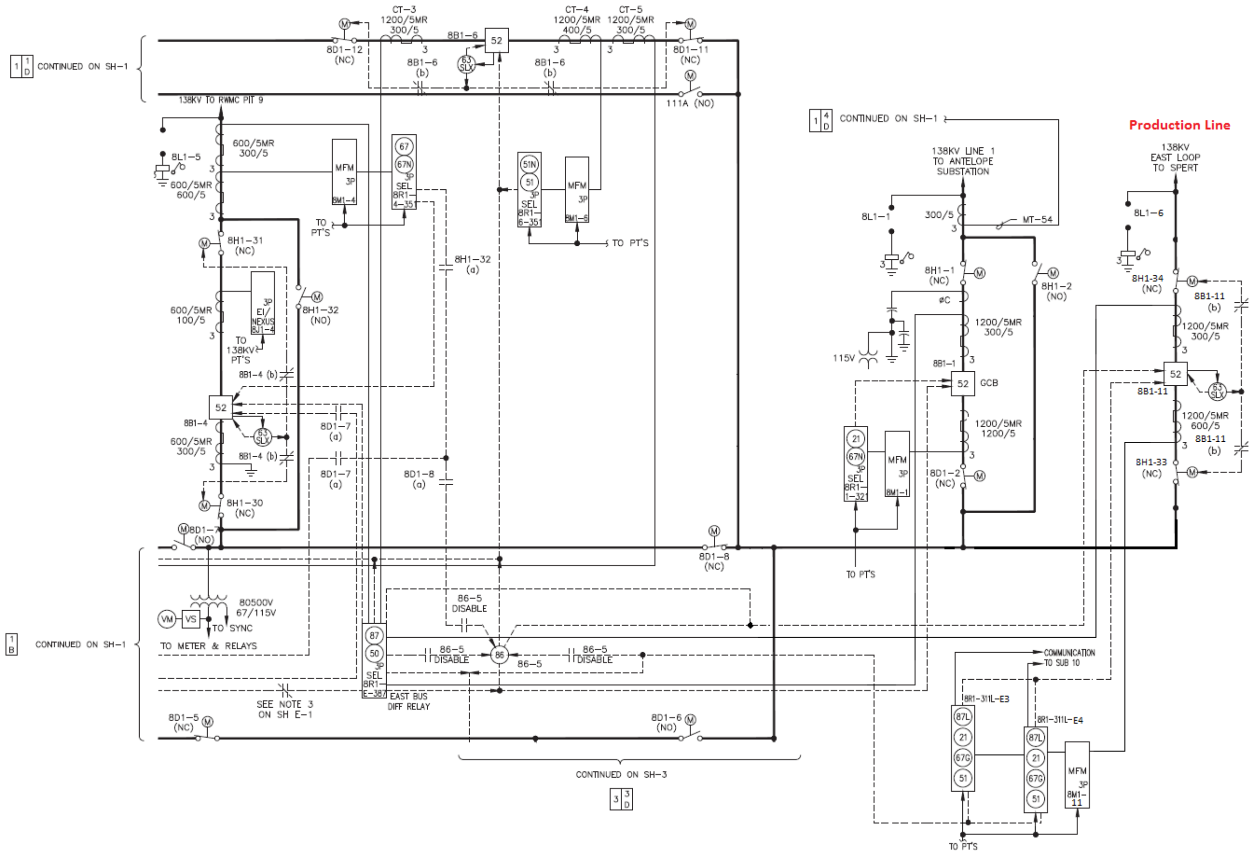

Figure A3. Scoville One-Line detail 2.

Scoville Substation Control Room Additions. The proposed action locates control equipment in the control building (i.e., CF-681) and protection and control equipment in the vertical section lineup in the main dispatch arena. The remote terminal unit has spare points for control without upgrades.

Project activities also include modifying the mimic board to reflect adding the new line and relocating the CITRC line. Figure A4 shows the Scoville control room layout.

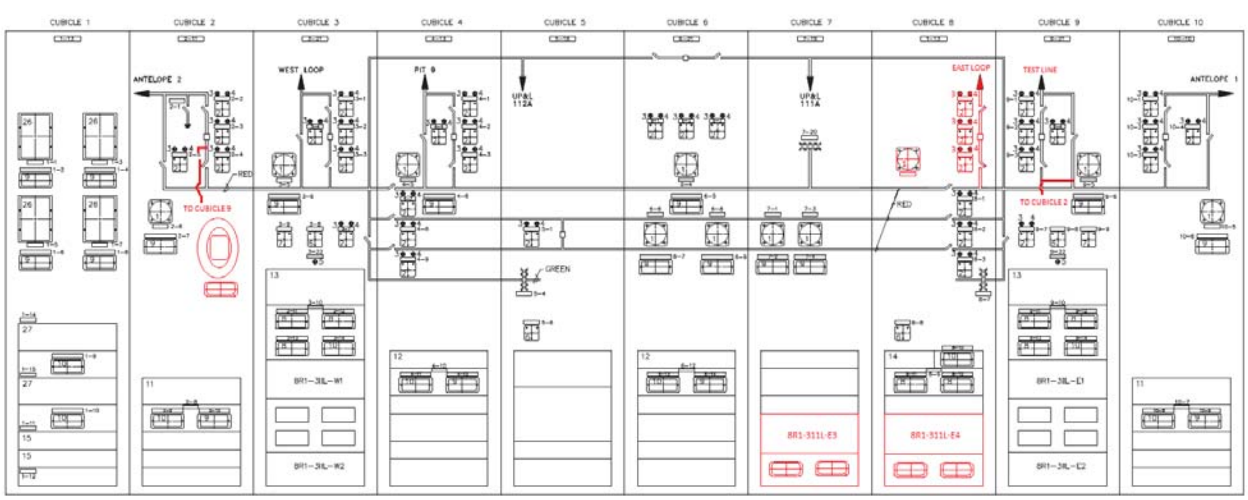

Figure A4. Scoville control room layout.

Duct Bank Installation. Substation expansion includes grading and developing the site and above grade and below grade construction, testing, and energization. Crews install power conductors above ground and install communication cables above ground in cable trays or route the cables underground in small duct banks to connect to substation communication systems.

The proposed action requires duct banks for communication cables in the substation. Following trenching, personnel install cable conduits (separated by spacers) and pour concrete around the conduits to form the duct banks. Typical duct banks consist of 2 and 6-in. diameter polyvinyl chloride conduits, which house electrical cables, that are about 3 ft wide by 4 ft deep. The proposed action installs ducts for communication cables used for system protection and communication purposes. Following polyvinyl chloride conduit installation, crews fill the remaining trench with engineered backfill.

Where duct banks cross or run parallel to substructures, the proposed action requires a minimum radial clearance of 18 in. These substructures include gas lines, telephone lines, water mains, storm drains, and sewer lines. Where duct banks cross or run parallel to substructures that have operating temperatures exceeding earth temperature, an increased radial clearance may be required. These heat-radiating facilities include underground transmission circuits, primary distribution cables (e.g., multiple-circuit duct banks), steam lines, or heated oil lines. In addition, increased radial clearance may be required where new duct banks cross other heat-radiating substructures at right angles.

Cable Pulling, Splicing, and Termination. After installing conduit, crews install cables in the duct banks. Personnel pull each cable segment into the duct bank, splice cables at each vault, and terminate cables where the line converts to an overhead conductor. All vaults are above ground. To pull the cable through the ducts, personnel place a cable reel at one end of the section and a pulling rig at the other.

Crews pull about two segments of electric and communication cables per day between vaults. A splice trailer facilitates cable splicing after the cables are pulled through the ducts. The vaults must be kept dry to keep unfinished splices dry and impurities from affecting the cables. At each end of the underground segment, the cables rise out of the ground and terminate on equipment within the transition station or substation.

Site Cleanup

The proposed action restores disturbed areas (including pull sites, reel sites, structure removal sites, and staging areas) to near preconstruction conditions following construction. Restoration includes grading and restoring sites to original contours and active revegetation using native seed. In addition, the project removes construction materials and debris and recycles or disposes the materials as appropriate. The project completes final surveys to verify completion of cleanup activities.

Permanent Land Use

The proposed action requires about 227 acres of new permanent use in the project area.

Power Line Operations and Testing

Future testing on the new and reconfigured test beds may include temporary installation of diesel generators, 138/13.8-kV transformers, SF_6 gas-filled circuit breakers, switchgear, load banks, instrumentation, and battery trailers. This temporary arrangement allows user reconfiguration for different test scenarios.

The PGTB enables real-time monitoring for anticipating faults and rapid isolation to create a robust automation and control system. Accurate sensors, synchronized clocks, increased communication, and data recording play a role in a modernized grid.

The PGTB aims to allocate a place for utilities, vendors, and independent researchers to test new equipment and logic before use in a live system to increase confidence in new technology and decrease errors. Testing activities temporarily place equipment (e.g., electric power-related devices, instruments, and test support trailers and shelters) at test locations between CFA and MFC under or near the old 138-kV transmission line. The reconfigurable arrangements allow various test scenarios. Test equipment includes, but is not limited to, the following:

- Portable gas or diesel generators, ranging from 1,000 watts to about 4 megawatts
- Power transformers from 480 V to 138/13.8 kV
- Circuit breakers, switchgear, load banks, instruments, and battery trailers
- Temporary low and medium voltage (up to 35-kV class) electrical cables and communications fiber and cable installed on pole structures, on the ground, or in facilities
- Temporary control shelters and equipment trailers
- Automotive batteries (12-volt sealed lead-acid) for remote power.

Testing activities involve up to 30 people and numerous vehicles at PGTB. The repetitive nature of R&D and training activities at PGTB demands ongoing review, work, and daily involvement of several personnel with specialized expertise. Testing includes defining research questions and test objectives, developing test articles, setting up and calibrating test instruments, conducting tests, analyzing results, and using results to develop future experiment objectives. Implementing the proposed action requires a systematic review of individual test activities.

Testing activities include power management operations and maintenance and placing sensors and measuring equipment around the substation, on or around power lines, and in or around the facilities and buildings. Testing includes the following:

- Access test locations using established roads
- Place equipment per test requirements
- Remove test and support equipment following testing
- Monitor unmanned equipment on a periodic basis.

Installing temporary antennas, cable, and other equipment has the potential to disturb soils. Some testing places equipment, instruments, and sensors on the ground or in holes. Holes measure about 12 to 36 in. in diameter and are refilled after testing.

Tests have potential to cause (a) a power line to fail, (b) a short to ground, (c) a phase to phase short, (d) exploding electrical gear, or (e) a combination of these or similar events. Testing also has the potential to cause other equipment attached or associated with the power grid to fail.

Integrating New and Old Systems. When introducing state-of-the-art technology, new equipment and legacy systems must interact. PGTB allows testing interoperability of new and legacy systems. To test interoperability of two different Supervisory Control and Data Acquisition (i.e., SCADA) and control systems, users connect new and legacy systems and auxiliary equipment to the network and place master systems in a control house connected to a robust communication network that also connects to remote stations and equipment. Relays and other connected devices add data and mimic a real system. Testing includes running the system in a normal state and in a faulted state to verify the network can handle increased data. These tests support hands-on training by utility operators on the integrated system, improving operational efficiencies. Full-scale testing allows users to identify problems in a safe and controlled environment and to utilize experts to troubleshoot and find solutions.

Automatic Restoration. PGTB allows users to test motor-operated switches with sensing, control, and communication without introducing risk to the operational power grid. Users establish realistic test situations and deploy new system designs in a test environment to validate operational, functional, and performance and technical requirements. Users perform real-time troubleshooting on new designs to eliminate risks imposed by new switches on the system. In addition, the reliable, secure communications network allows users to test sensing, control, and communications functions of new systems prior to installing these components on the consumer grid.

Distributed Generation. Renewable energy, such as wind and solar, challenges the modern grid when located in areas without adequate transmission and by being an intermittent power source. Distributed generation, such as rooftop solar, increases system complexity because it allows customers to send power back to the grid, which increases the difficulty of balancing the load and generation. PGTB delivers rapid configuration change and ground truth monitoring capabilities. Ground truth detection capabilities enable monitoring generation output, battery conditions, and voltage sag.

Demand Response. Utilities encourage customer habit change to decrease peak energy needs by offering price breaks for non-peak energy use and direct control of certain loads, such as air conditioners and clothes dryers. This decreases maximum generation needs and allows the utility to run generators less often. Monitoring usage requires networked smart meters paired with customer interfaces. This system type requires integration testing with legacy systems. To complete testing, users set up a mini-system that uses actual equipment and tests that the integrated system meets functional, operational, and technical performance requirements.

To test system adherence to functional, operational, and technical performance requirements, PGTB enables the utility to set up transmission and distribution level systems and deploy smart meters throughout the system. By coupling the ability to vary loads and network smart meters with a central control station, the utility evaluates the smart meter network to determine appropriate demand responses and consumer interfaces for efficient operations.

Micro-Grid. PGTB offers the ability to establish micro-grid systems. The use of remote switches and other equipment allows transmission and distribution lines to be modified to user demands. Ground truth instruments aid troubleshooting and verify that the system satisfies functional, operational, and technical and performance requirements, allowing for enhanced data collection.

Power Line Maintenance

Maintenance and inspection activities on power poles and structures include replacing poles and structures in poor condition and inspecting and replacing other components (e.g., anchors, insulators, cross-arms, wire, etc.). Under the proposed action, power line maintenance activities include the following:

- Applying fire retardant to wooden structures
- Evaluating structures
- Inspecting and replacing power line components (e.g., anchors, insulators, cross-arms, wire, etc.)
- Installing ground rods (about 6 ft from pole and 8 ft deep), ground plates, and avian protection devices
- Installing and repairing air switches
- Replacing gravel at established pads
- Replacing power lines and power poles
- Testing and treating wooden structures.

During power pole replacement, crews remove poles and place a new pole in the old hole or in a new hole about 10 ft from the old hole. Crews replace anchors by cutting the old anchor at grade and installing new anchors about 6 to 7 ft deep. Crews drill rock when necessary.

To complete test and treat activities, personnel remove about 18 in. of soil from about 12 in. around structures to allow inspection below grade. After inspection, personnel wrap a physical barrier around the pole to prevent degradation, then replace soil around the pole or structure.

Routine power line maintenance activities impact an area having about a 100-ft diameter around poles and support structures. Driving pole to pole is not authorized for maintenance activities and crews are restricted to using the T-25 power line access road. Vegetation disturbance from vehicle traffic is expected in the area around poles and support structures and, in limited circumstances, where direct-line travel from a road to a power pole or structure is required in order to complete routine maintenance activities.

The maintenance required for ductile iron poles is anticipated to be reduced compared to wooden power poles based on information from similar power lines around the United States. The lower anticipated maintenance limits the amount of traffic needed at each pole location after construction is complete.

Appendix B
Proposed Locations for Laydown and Parking Areas

Appendix B
Proposed Locations for Laydown and Parking Areas

The figures in this appendix detail preferred locations for laydown and parking areas needed for completing the proposed action.

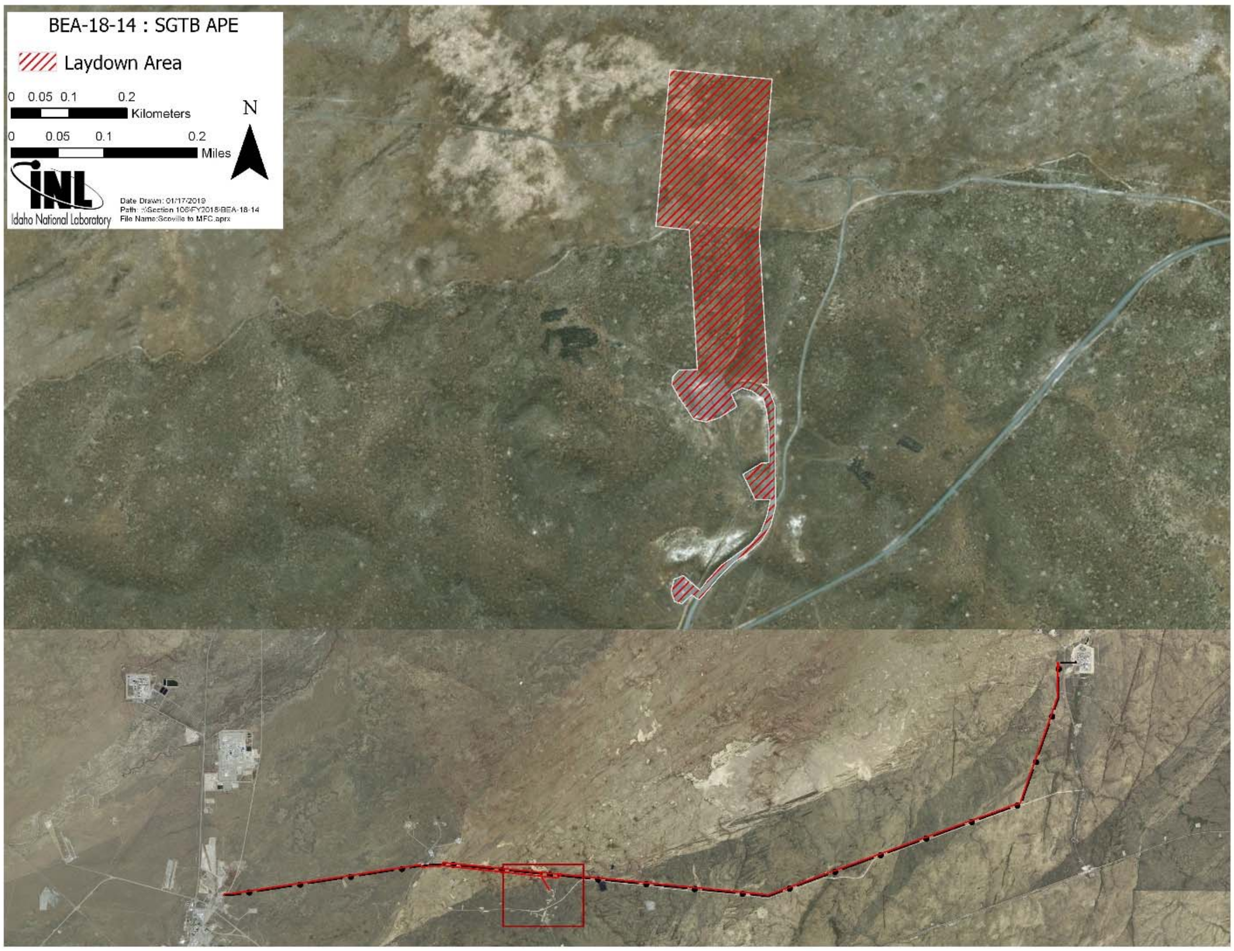

Figure B-1. Location near the Bode test pad.

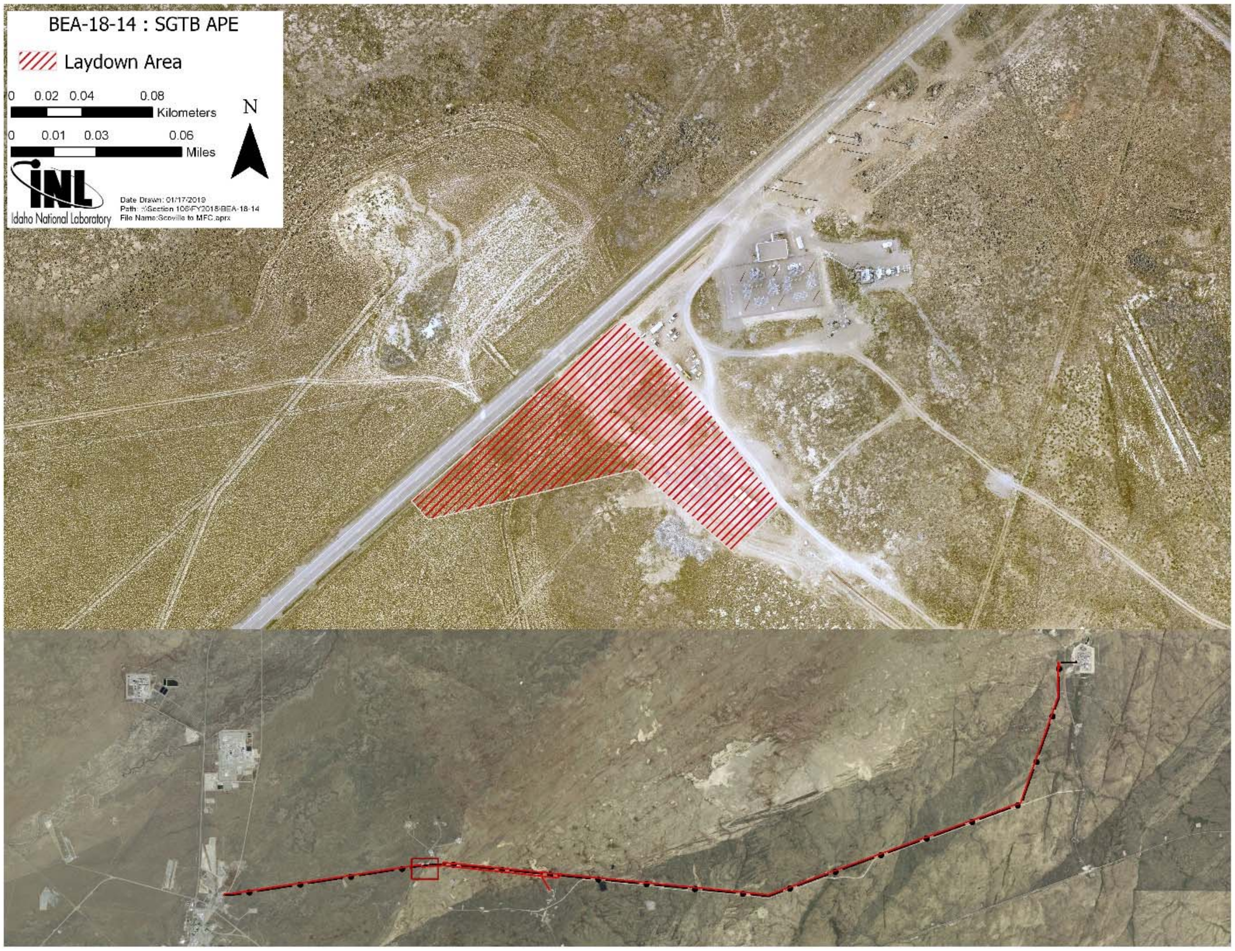

Figure B-2. Location near CITRC.

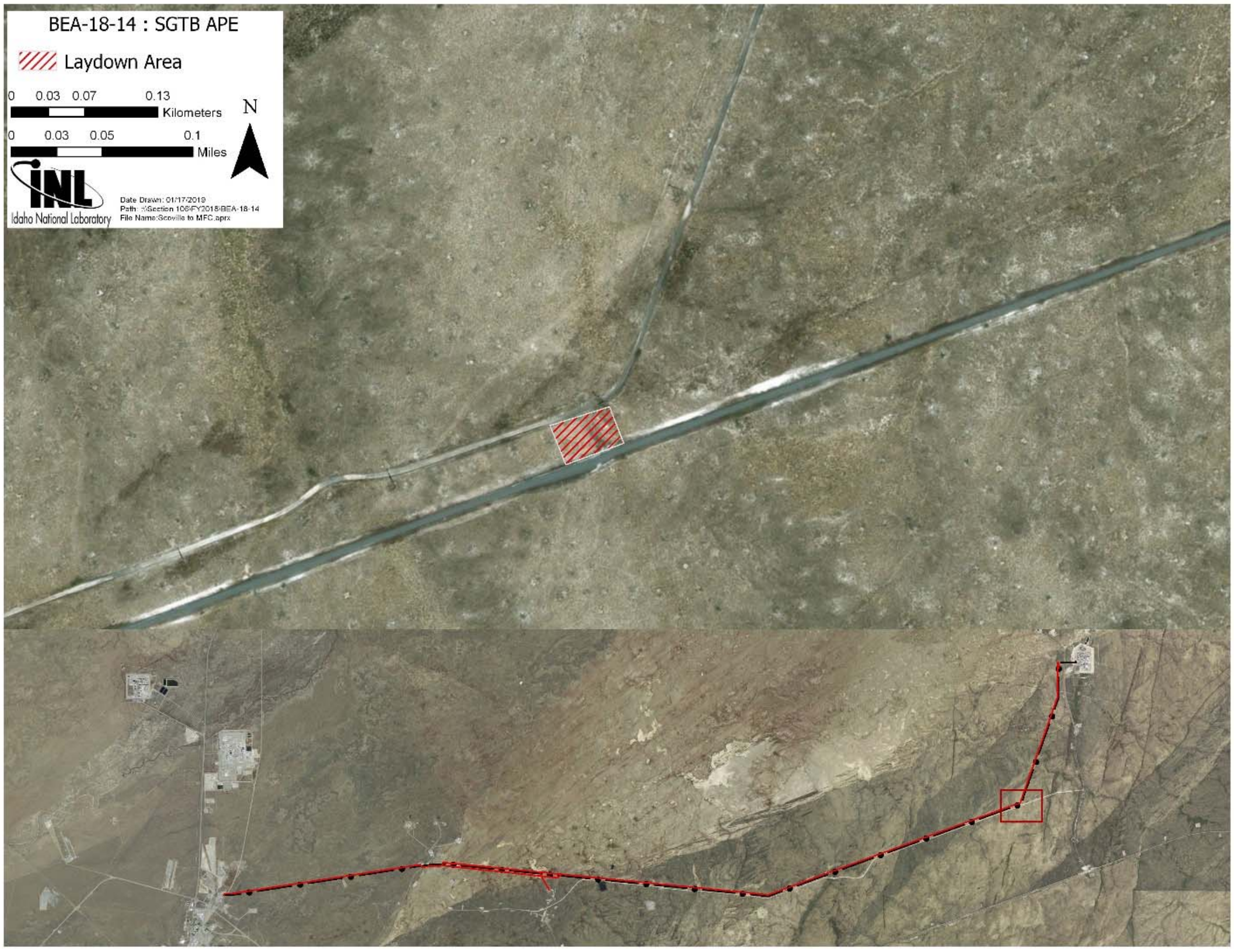

Figure B-3. Location at OHL corner near MFC.